

**BEFORE THE  
SURFACE TRANSPORTATION BOARD**

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**STB Docket No. EP 704 (Sub-No. 1)**

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**REVIEW OF COMMODITY, BOXCAR,  
AND TOFC/COFC EXEMPTIONS**

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**COMMENTS OF  
NORFOLK SOUTHERN RAILWAY COMPANY**

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## **I. Executive Summary**

Norfolk Southern Railway Company (“NS”) supports the agency’s move towards data-based decisionmaking. It is a particularly wise choice here. Given the gravity of a decision to reverse a prior exemption by the agency, reinstating federal regulation on unregulated traffic must be guided by data alongside additional sources of real-world evidence that support such data. Yet data can be a dual-edged sword. Too much can distract, mislead, or paralyze; and a “less auspicious aspect[] of the enormous growth of our federal bureaucracy” is its “seemingly insatiable appetite for data.” *Dole v. United Steelworkers of America*, 494 U.S. 26, 32 (1990). Therefore, it is important that the STB not end up data rich, but information poor.

The Office of Economics (“OE”) has undertaken a commendable first step with its use of exploratory data analysis to mine the depths of the Confidential Carload Waybill Sample (“CCWS”). The centerpiece of this effort was a sophisticated Geographic Modal Influence Model (“GMIM”) drawn from a variety of databases, which adds a new overlay to the CCWS. OE then created over one thousand matrices and “violin plots,” and a dashboard of indicators to visually present the improved data. In providing comments on this first-generation analysis, NS is mindful that it is easier to tear down than to build up. Its goal, therefore, is to both explain its real concerns with the approach and provide specific suggestions towards a second-generation framework.

NS is proposing to transform this preliminary exploratory data analysis into a superior “Competitive Influence Waterfall” built on four pillars:

- 1) Use more and better rail/truck modal share data from an unimpeachable government source;
- 2) Augment the exploratory data analysis with traditional statistical tools to tease more reliable inferences from the data;

- 3) Respect the Board’s observation that “R/VC ratios do not provide a reliable measure of changes in captivity over time,”<sup>1</sup> by cabining the role of R/VC ratios to the gatekeeping function contemplated by Congress; and
- 4) Accept the limits of data analysis by acknowledging the need for case-specific evidence before taking the unprecedented step of reregulating traffic that has been unregulated for generations.

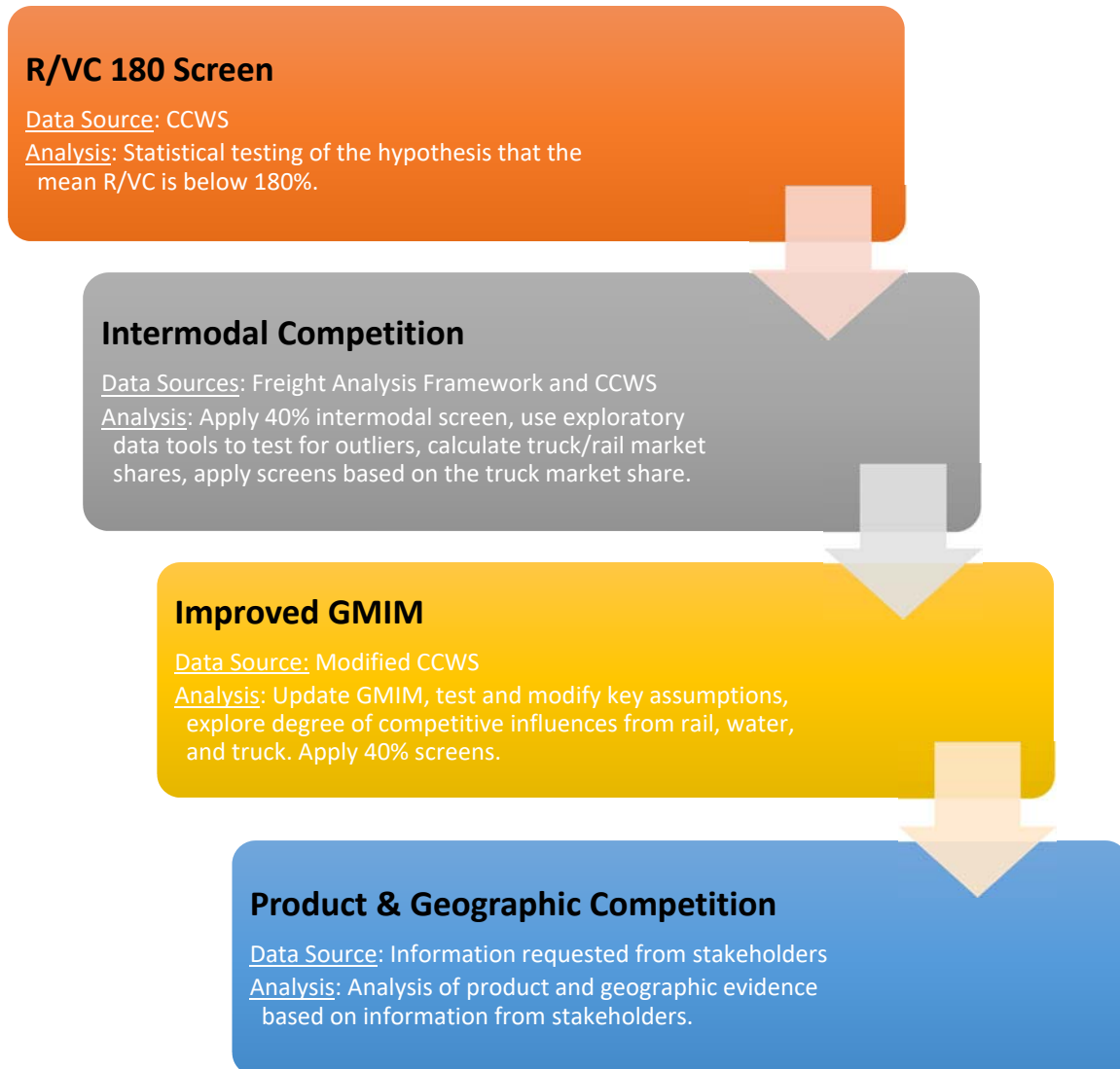
The Competitive Influence Waterfall is described in the Verified Statement by Dr. Mark Israel.<sup>2</sup> It can be visually depicted as a waterfall exploration of the influences of competition revealed by various data sources.

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<sup>1</sup> Comments of the STB to the Government Accountability Office regarding “Freight Railroads: Industry Health Has Improved, but Concerns about Competition and Captivity Should be Addressed,” September 15, 2006 (hereinafter “STB Comments to GAO (2006)”), *available at* <https://www.gao.gov/new.items/d0794.pdf>.

<sup>2</sup> See Verified Statement of Dr. Mark Israel (January 29, 2021) (hereinafter “Israel V.S.”).

**Figure 1: Competitive Influence Waterfall**



The **first stage** tests the hypothesis that the majority of traffic under consideration has an R/VC ratio above 180%.

The **second stage** explores an unimpeachable truck/rail dataset to determine whether the rail industry has a dominant share of that market. Because the public government data is reported at the 2-digit SCTG level, this stage also uses pricing information and exploratory data analysis tools to explore whether the

5-digit STCC commodity has sufficiently distinct transportation characteristics that the 2-digit SCTG modal shares may not be informative.

The **third stage** improves upon OE's GMIM concept by offering suggestions to capture more movements that are influenced by competition; to test and bolster the key assumptions within the model; and to modify how the resulting exploratory data analysis is presented.

The **fourth stage** steps away from the data dashboard and directs shippers seeking a revocation of an exemption to submit specific information to guide a deeper analysis of product and geographic competition.

The Competitive Influence Waterfall was designed in the first instance as a data-driven tool to gauge whether existing exemptions should be stripped away. It can also be deployed to justify a new exemption. In those circumstances, NS would urge the agency to run the entire waterfall. It would start by examining whether the majority of traffic is below 180%, and thus has effective competition per the Congressional mandate. The Board would then explore the Freight Analysis Framework data for signs of pervasive intermodal competition, dig into the updated GMIM for further evidence of competition from rail, water, and truck, and (if relied on by the petitioner) seek evidence from stakeholders of product and geographic competition. While the data analysis of any stage might confirm the suitability of a new exemption, NS believes it would be wise for the agency to run the entire waterfall and understand the full scope of competitive market forces before granting a new exemption request.

Dr. Israel cautions that while the steps he recommended are “designed to provide a systematic process to examine and test whether there is sufficient competition such that regulation is not warranted” there can be “no formulaic

‘cookbook’ approach to assessing competition.”<sup>3</sup> This framework provides tests and indicators to inform the analysis, but “it cannot replace a deeper dive into the relevant facts of the case, nor prevent stakeholders from seeking to demonstrate why the steps presented here point to the wrong outcome.”<sup>4</sup>

The result is an improved tool that can inform decisionmaking, but must not serve as the decisionmaker. This second-generation framework would supplement, but not replace, the traditional case-specific evidentiary proceeding that the agency is required to undertake before it either creates a new class exemption or strips away an important safeguard that has been in place for decades. NS expects that any interested stakeholders would have a full and fair opportunity to submit evidence of competitive forces revealed by the Competitive Influence Waterfall, and to supplement this framework with commodity-specific information of the competitive constraints (or lack thereof) on that transportation subsector.

**Section II** of NS’s comments provides an overview of the approach and resulting dashboard the OE has developed. **Section III** explains the next-generation approach that Dr. Israel is recommending, which is grounded in statistical methods and reliable metrics that can be used to inform questions of exemption revocation. **Section IV** reviews the material improvements that Dr. Israel’s approach introduces to the approach developed by OE.<sup>5</sup>

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<sup>3</sup> Israel V.S. at ¶ 11.

<sup>4</sup> *Id.*

<sup>5</sup> NS fully endorses the comments of the Association of American Railroads (“AAR”) and nothing herein should be viewed as inconsistent with the AAR’s more fulsome discussion of OE’s exploratory data analysis.

## **II. The Approach and Dashboard Developed by the Board's Office of Economics**

### **A. Overview.**

On September 30, 2020, the Board served a decision ("September Decision")<sup>6</sup> seeking public comment concerning a new approach OE developed in connection with the 2016 notice of proposed rulemaking ("NPRM") the Board issued on this docket regarding the potential revocation of existing class exemptions under 49 C.F.R. part 1039 for (1) crushed or broken stone or rip rap; (2) hydraulic cement; (3) coke produced from coal; (4) primary iron or steel products; and (5) iron or steel scrap, wastes, or tailings.<sup>7</sup>

After reviewing the lengthy history of this docket, the Board introduced in its September 30 Decision a new, data-driven approach OE has developed to aid the Board's understanding of these issues. The data-driven approach uses data from the years 1992 and 2018 in the CCWS, as well as certain other data sources, to analyze and measure changes that have occurred between those two years with respect to certain metrics relating to the rail transport of certain commodities. The metrics OE chose to analyze illustrate certain changes in characteristics of markets for the rail transport of certain commodities. Importantly, however, OE does not present any evidence to demonstrate that the chosen metrics are significantly correlated to measures of market power or any other meaningful indication of competitive conditions for the rail transport of a given commodity.

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<sup>6</sup> Review of Commodity, Boxcar & TOFC/COFC Exemptions, EP 704 (Sub-No. 1), slip op. (STB served Sept. 30, 2020).

<sup>7</sup> The NPRM also invited interested parties to file comments regarding the possible revocation of other commodity class exemptions.

B. Key Features of OE's Approach and Dashboard.

OE's approach and resulting dashboard ("OE Dashboard") synthesizes CCWS and other data to generate over 1,500 matrices and plots that illustrate changes over time in certain market conditions governing a commodity. NS summarizes below what it considers to be the key features of the approach OE developed.

*Geographic Modal Influence Model.* The GMIM, according to OE, was designed to attempt to account for the impact of intramodal and intermodal alternatives on the rail transportation market for the specific commodities at issue.<sup>8</sup> OE premised the GMIM on the proximity of potential water carrier and other rail carrier alternatives to the railroad freight stations that appear in the CCWS and used various, publicly available data sources (*e.g.*, U.S. Army Corps of Engineers Institute for Water Resources Port Facilities Data, Centralized Station Master and Mark Register) and computer programs and scripts (*i.e.*, ArcGIS Pro 2.5) to map and calculate which of those ports and stations are within 30 miles of a freight station that appears in the CCWS.<sup>9</sup> To account for the impact of potential sources of competition from trucks, OE looked to whether the length of haul for a particular movement in the CCWS exceeds 500 miles.<sup>10</sup> The GMIM's output is binary: it

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<sup>8</sup> September 30 Decision at p. 7.

<sup>9</sup> OE further limited the list of potential rail alternatives within that 30-mile radius to those stations that moved the same 5-digit STCC commodity as the station in question from the CCWS and in the same year. OE admitted this metric is "under-inclusive in that there are likely cases where any traffic moving would signify a viable route, regardless of what commodity is being moved, or where only specific commodities could not move on that route (*e.g.*, if an alternative only had movements of barley in a given year and the incumbent move is of corn, it would not be considered viable even though they are both very similar grain commodities)." It is also "under-inclusive since stations without traffic [in a given year] may still be functional if there was any demand for traffic, and there may even have been traffic in the year preceding or following the year of the study." *See* September Decision at Appendix A, p. 23.

<sup>10</sup> OE admitted that this metric of measuring the competitive pressure of trucks was "under-inclusive in that there are some commodities and shippers that may have a viable truck alternative for longer distances." *See* September Decision at Appendix A, p. 23.

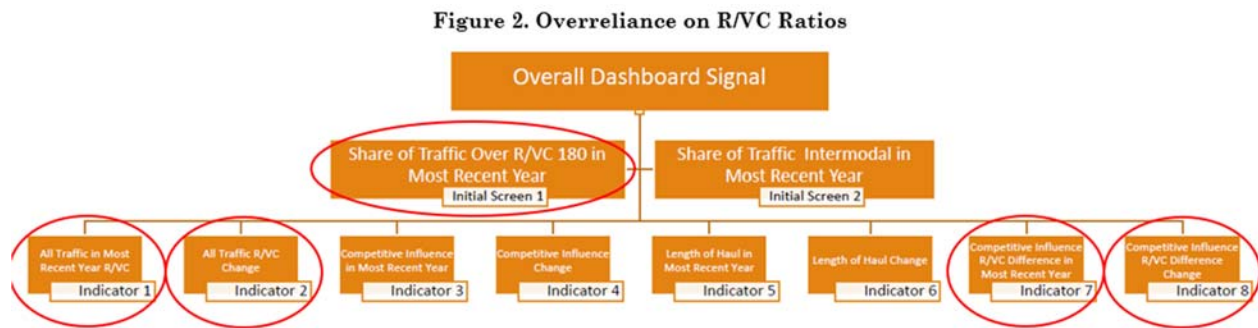
assigns influence of alternative carriers to a given movement if the screens are met, and no influence of alternative modes of transportation if the screens are not met.

NS supports OE's interest in the impact of alternative modes of transportation on the movement of a given commodity, but, as NS explains in more detail below, see *infra* Section III.B, OE's approach requires refinement before it can be used to measure the true, competitive constraints that these other modes of competition exert on the rail transport of a particular commodity.

*Exploratory Data Analysis.* In the Technical Conferences that took place on December 18, 2020, and January 15, 2021, OE indicated that it employed a technique known as Exploratory Data Analysis ("EDA") to visualize the outputs of the models and approaches it developed and attempt to "groom insights" about what those visualizations reveal about market conditions for various movements. The hallmarks of the EDA that OE undertook are the 1,570 distribution matrices and violin plots OE generated and, relatedly, the OE Dashboard. OE admitted on several occasions that audiences should not draw particular conclusions from the EDA it undertook and cautioned that the OE Dashboard's readings were simplistic attempts to aggregate and summarize the 1,570 underlying data visualizations.

NS agrees wholeheartedly with this word of caution about the limits of EDA but notes again that, with certain improvements—in particular, an overlaying of traditional statistical tools that can be used as a complement to the EDA OE has performed—users can draw from the CCWS and other public data sources more reliable inferences regarding the ultimate question of whether an exemption is appropriate for a given commodity.

*Reliance on Changes in R/VC Ratios.* OE’s approach and resulting OE Dashboard rests in large part upon an EDA of R/VC ratios and the degree to which they have changed from 1992 to 2018. Indeed, as depicted in Figure 2 below, comparisons and distributions of R/VC ratios form the basis of one of the two initial screens and four of the eight key indicators that OE has chosen to analyze, and that feed into the overall signals in OE’s Dashboard.<sup>11</sup>



The shared goal of the Board, rail, and shipping interests is to derive conclusions that can assist the Board in determining whether the movement of a certain commodity is subject to unconstrained rail market power, yet an analytical framework like OE’s that places such overreliance on R/VC ratios is fatal to reaching that end. As the Board itself observed, “R/VC ratios do not provide a reliable measure of changes in captivity over time, because they can increase even when rates are falling where a carrier’s costs are also falling.”<sup>12</sup> Therefore, policy

<sup>11</sup> In its opening comments in this docket, the U.S. Department of Transportation (“DOT”) cautioned the Board not to “plac[e] undue reliance upon any single measure as a proxy for market conditions.” U.S. Dep’t of Transp. Cmt. at p. 2 (July 26, 2016). With respect to R/VC ratios in particular, DOT stated that they “may not be a sufficiently robust indicator of whether revocation of a commodity exemption is warranted.” *Id.*

<sup>12</sup> STB Comments to GAO (2006); *see also* Laurits R. Christensen Associates, Inc., Report, A Study of Competition in the U.S. Freight Railroad Industry and Analysis of Proposals that Might Enhance Competition (Nov. 2009) at ES-14 (hereinafter “Christensen Study”), *available at* <https://prod.stb.gov/reports-data/reports-studies/> (“The R/VC ratio, applied prudently, may be able to identify categories of shipments that travel at high rates relative to costs, but the R/VC ratio is not very useful as an indicator of the presence of market structure factors that would increase a shipper’s ‘captivity’ to an individual railroad. The weak relationships between R/VC ratios and market structure factors . . . imply that correctly assessing the presence of market-dominant behavior requires direct assessment of relevant market structure factors. Thus, regulatory reforms

makers cannot ascribe competitive significance to high or changing R/VC ratios;<sup>13</sup> these ratios alone fail to account for the fact that increasing R/VC ratios could be attributed to greater productivity by railroads, price reductions for customers, enhancements for customers, greater competition, or some combination of these factors. As discussed in greater detail in Dr. Israel's Verified Statement and below, the emphasis on R/VC ratios in OE's approach and the OE Dashboard is a significant flaw and threatens the integrity of the entire initiative.

*Clear Recognition of Data Limitations.* In its decision, the Board clearly recognizes that OE's approach does not "necessarily provide a final conclusive answer on whether the commodity exemptions at issue should be revoked, or whether additional commodity exemptions should be adopted."<sup>14</sup> Instead, the determinations as to whether a commodity exemption should be revoked are "complicated and multi-factored."<sup>15</sup> The Board then goes on to acknowledge that the approach "has limitations . . . and relies on certain assumptions."<sup>16</sup> OE echoed this sentiment in the Technical Conference on January 18, 2021, and, on numerous occasions during that Technical Conference, characterized its approach as "pre-decisional."

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that would establish R/VC tests as the sole quantitative indicator of a railroad's market dominance are not appropriate.").

<sup>13</sup> Railroad interests have raised concerns repeatedly in this proceeding in particular about shippers' reliance on the Board's R/VC figures, arguing that R/VC ratios are not a reliable indicator of market power. *See, e.g.*, AAR Reply Cmt. at 2-6 (Aug. 26, 2016); CSXT Reply Cmt. at pp. 2-3 (Aug. 26, 2016); NS Reply Cmt. at pp. 3-4, 16, 23-24 (Aug. 26, 2016).

<sup>14</sup> September Decision at p. 6.

<sup>15</sup> *Id.*

<sup>16</sup> For example, the Board acknowledges that, "[a]mong other limitations, the approach does not itself consider the potential for pipeline transportation alternatives, given that none of the commodities at issue are capable of being transported via pipeline, and does not consider whether there are physical limitations that might prevent a commodity from being shipped by otherwise-available truck transportation alternatives." *Id.*

Ultimately, the Board and OE are aligned that, without more, OE's approach and EDA techniques will not determine the outcome of a request to exempt or revoke. With further refinement, however, NS believes the outputs of an approach like the one OE developed could be more useful in an exemption proceeding, particularly if the inputs were significantly correlated to measures of market power and competitive conditions for the movement of a given commodity.

### **III. Dr. Israel's Competitive Influence Waterfall**

NS welcomes this opportunity to provide feedback to the Board on OE's approach and ways to improve it. While the motivations behind the work and analysis that OE has prepared are well-founded, as it currently stands, OE's approach does not yield information germane to the Board's consideration of whether to revoke or grant exemptions under 49 U.S.C. § 10502. That being said, there are clear aspects of OE's approach that can be improved upon in order to lead the Board to more reliable inferences of market power and other indicators that regulation of a particular commodity might be necessary on a class-wide basis.

The Board recognized in its September Decision that understanding market conditions is important when considering commodity exemptions and revocation of commodity exemptions; indeed, NS believes such understanding is paramount when considering critical questions like whether to revoke or grant class-wide exemptions. To develop a data-driven approach that examines the question of whether railroads have unconstrained market power for the movement of a particular commodity, any metrics that are being considered must have proven ties to competitive dynamics of a market, including market power.

For these reasons, NS retained Dr. Israel to develop a second-generation framework to build on the data-driven wisdom of OE's approach, and advances that approach towards a tool that can serve the Board reliably as an initial or partial

step in evaluating whether an existing commodity class exemption should be revoked. To forge a tool that is capable of generating recommendations, Dr. Israel's second-generation framework (1) augments competitively meaningful data including data that accounts for intermodal market shares; (2) pares back reliance on less competitively meaningful data like R/VC ratios; and (3) incorporates well-established, statistical methods for testing hypotheses.

Dr. Israel therefore has developed a framework—as illustrated in **Figure 1** above—that applies a linear waterfall of screens and data analysis based on various indicators of competition to empower the Board with conclusions that can help it determine whether a given commodity merits regulation. The four stages are described below.

A. The First Waterfall—An Initial Screen for R/VC Ratios.

Although R/VC is an unreliable indicator of market power, and therefore it cannot be used as a tool for assessing competition for the transport of a given commodity, R/VC ratios can serve as a meaningful screen for whether there is effective competition as determined by Congress. Congress has determined that movements with R/VC ratios below 180% conclusively have effective competition and are free from STB rate regulation.<sup>17</sup> Therefore, Dr. Israel describes in his Verified Statement, if a commodity's mean R/VC ratio is sufficiently above 180%—thereby indicating the first step towards Board jurisdiction over a commodity—the Board should proceed with a more fulsome analysis of whether additional data and other sources of evidence warrant Board regulation of a given commodity.<sup>18</sup>

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<sup>17</sup> See 49 U.S.C. § 10707(d)(1)(A).

<sup>18</sup> See Israel V.S. at IV.A.

B. The Second Waterfall—Screens for Intermodal Competition.

Once a given commodity passes the initial R/VC screen, the Board should move on to the next step of beginning to analyze the degree of competition presented by other modes of transportation. As discussed above, OE’s approach lightly touches on competitive alternatives to rail, using only rough and limited indicators of the existence of such alternatives and the degree to which they constrain rail.<sup>19</sup> A robust analysis of intermodal competition and its effects, however, must include an analysis of modal market share data.<sup>20</sup>

For this reason, the Board should expand its use of data beyond the CCWS, which includes data regarding movements of commodity by rail only, to include other public data sources such as the Federal Highway Administration’s Freight Analysis Framework (“FAF”) that can provide a reliable picture of modal shares for the movement of a given commodity. As Dr. Israel notes, “[i]f non-rail modal shares for a given commodity are high—i.e., above 50%—there is evidence of sufficient modal competition, the Board cannot reject the hypothesis that there is competition from other modes of transportation, and the Board can stop its analysis.”<sup>21</sup> The hypothesis that competition is sufficient to discipline rail rates cannot be rejected unless these sources of modal competition are analyzed using proper metrics of those sources’ competitive influence.

C. The Third Waterfall—Enhanced GMIM Indicators.

If modal market shares alone do not allow the Board to conclude that there is sufficient intermodal competition, the Board should proceed to apply the third step of Dr. Israel’s waterfall. The third step is a screen that acts as an enhanced version

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<sup>19</sup> *See supra* Section II.B.

<sup>20</sup> *See, e.g.*, DEP’T OF JUSTICE & FED. TRADE COMM’N, HORIZONTAL MERGER GUIDELINES § 5 (2010); *see also* Israel V.S. at ¶¶ 61-62.

<sup>21</sup> Israel V.S. at ¶ 78.

of OE's GMIM, and assesses both competition from direct rail alternatives and competition on a specific route from other modes.<sup>22</sup>

Dr. Israel's enhanced GMIM not only offers suggestions to capture more movements that are influenced by alternative sources of competition, but also urges OE to apply econometric analyses based on data to determine appropriate levels for the screens and key mileage thresholds (*i.e.*, 30 miles for rail and water, 500 miles for truck) within the GMIM.<sup>23</sup>

D. The Fourth Waterfall—Product and Geographic Competition.

Finally, NS agrees with the Board that the decision whether to grant or revoke a class-wide exemption is complex and multi-factored and, while data can lead the Board to important preliminary conclusions regarding the competitive effects of other sources of competition, it has its limits. In particular, raw data from the CCWS and FAF cannot adequately capture the competitive effects of alternative geographies or from substitute products, both of which are significant sources of competitive constraints that a proper assessment of competition in a market must consider.<sup>24</sup>

Therefore, in addition to publicly available sources of raw data such as the CCWS and FAF, the Board should gather qualitative, documentary evidence from shippers, railroads, and even third parties such as trucking companies, in any potential exemption or revocation proceeding. Such evidence would better aid the Board in evaluating the presence of geographic and product competition and serve as a check to ensure the inferences from the data are borne out by real-world

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<sup>22</sup> See Israel V.S. at Section IV.C.

<sup>23</sup> See Israel V.S. at ¶¶ 88 and Section IV.C.

<sup>24</sup> See, *e.g.*, DEP'T OF JUSTICE & FED. TRADE COMM'N, HORIZONTAL MERGER GUIDELINES § 4 (2010); see generally Israel V.S. at ¶ 115 and Section IV.D.

dynamics. This additional evidence will allow the Board to better understand the competitive and other factors that might preclude or permit a railroad from exercising market power over a given commodity.

\* \* \*

NS and Dr. Israel welcome further dialogue regarding this new proposal and its practical application. No model is perfect and the goal here is to advance the models in the right direction. Ultimately, NS is aligned with the Board and its commitment to “ensuring that a robust analysis be conducted when determining whether to proceed with any commodity exemptions or exemption revocations”<sup>25</sup> and this second-generation framework was designed with that end in mind.

#### **IV. The Waterfall Materially Improves OE’s Approach.**

Dr. Israel’s second-generation framework advances OE’s proposal in several important ways: (1) it integrates unimpeachable government data on truck modal share into the analysis; (2) it infuses the analysis with traditional statistical tools that complement the exploratory data tools used by OE; (3) it focuses the exploratory analysis on the *current* competitive market conditions in this decade; and (4) it cabins the role of R/VC ratios to the gateway function intended by Congress. We elaborate below.

##### **A. The Waterfall Integrates Best Available Truck Market Share Data.**

If there is a single recommendation that rises above all others, it is that OE should integrate the best available truck market share data into its exploratory data analysis. Competition from trucks was the dominant force behind Congress’s decision to deregulate the rail industry with the Staggers Rail Act. At the time, Congress noted that, “Railroads are 100 percent regulated under the Interstate

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<sup>25</sup> September Decision at p. 5.

Commerce Act. The overall effect of that regulation has meant that railroads have been severely handicapped in their ability to compete with other modes of transportation. The Committee notes with alarm that the railroads' decline in market share seems to cut across almost all areas of freight transportation."<sup>26</sup> Congress's alarm at the declining market share prompted them to direct the ICC to use the exemption power "to the maximum extent" consistent with the Act and remove the "severe handicap" of unneeded regulation.

The ICC took up the call from Congress and exempted various commodities "where regulation is deemed unnecessary because truck competition provides protection for shippers from market abuse."<sup>27</sup> And a central inquiry by the ICC was a deep dive into truck/rail modal shares by commodity.<sup>28</sup>

NS therefore recommends that OE integrate the FAF into its analysis. While there are other sources of intermodal data OE could explore, Dr. Israel explains how the public FAF data can be used as a screen to explore whether a surging share by rail might indicate a competitive market failure. It is produced through a partnership between the Bureau of Transportation Statistics and the Federal Highway Administration, and integrates data from a variety of sources to create a comprehensive picture of freight movement among states and major metropolitan areas by all modes of transportation.<sup>29</sup> The FAF is unimpeachable public data.<sup>30</sup>

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<sup>26</sup> H.R. Rep. No. 96-1035, 96th Cong., 2nd Sess. (May 16, 1980) at 38 (cleaned up).

<sup>27</sup> *Rail General Exemption Authority – Miscellaneous Manufactured Commodities*, 1988 WL 225776 (ICC served Jan. 29, 1988).

<sup>28</sup> *Id.*

<sup>29</sup> See Freight Analysis Framework Version 4, available at <https://faf.ornl.gov/faf4/Default.aspx>.

<sup>30</sup> The Board prefers public data from neutral government sources. See, e.g., *Texas Municipal Power Agency v. Burlington Northern & Santa Fe Ry.*, 7 S.T.B. 803, 822 (2004) ("[T]he Board regards the forecasts developed by [the EIA], a neutral governmental source, as more reliable than forecasts developed by private parties for litigation, which are inherently subject to manipulation."); see also *E.I. DuPont de Nemours & Co. v. Norfolk Southern Ry. Co.*, STB Docket No. 42125 at 266 (served

NS recognizes that the FAF data is reported at a 2-digit SCTG code level, which can be translated into the STCC code used in the CCWS. As Dr. Israel observes, however, “these data still address the most relevant question—shares by mode—and one should not throw out data on the relevant question simply because these data are less precise than other data which fail to address the relevant question. That is one should not substitute a measure of statistical precision for a consideration of the relevance of the data.”<sup>31</sup> As he demonstrates, OE can use other exploratory data analysis tools to test the theory that pricing of a particular 5-digit STCC commodity is sufficiently different to support a hypothesis that, while trucking is an effective competitor for others commodities in that national, 2-digit SCTG level, there is something unique about the commodity at issue. The method relies on the concept of calculating “fences” using the interquartile range (“IQR”), which is a method for identifying outlier values in a distribution advocated by statistician John Tukey, the father of exploratory data analysis.

With this tool, the Competitive Influence Waterfall uses (1) the percentage of traffic in the CCWS in intermodal service and (2) both the 2-digit FAF market share data and the 5-digit CCWS pricing data to gauge the degree of trucking competition. If more than 40% of the commodity moves in intermodal service, or the IQR test does not reveal an outlier and the FAF data shows a substantial truck share, then there would be no justification for revoking an exemption due to the substantial truck market share. The commodity would instead be a good candidate for an exemption.

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Mar. 24, 2014) (“Just as we look to policy-neutral, independent EIA forecasts volumes, we prefer the EIA forecast for fuel prices.”).

<sup>31</sup> Israel V.S. at ¶ 66.

What truck market share is sufficient to show no need for federal regulation? The economic literature offer no clear demarcation. However, the agency has made clear that, for an alternative mode to provide effective competition, it need not necessarily be “capable of handling substantially all or even a majority of the subject traffic.”<sup>32</sup> The federal courts agree.<sup>33</sup> Accordingly, in this second-generation framework, Dr. Israel has retained OE’s 40% market share delineation as a conservative assumption for when trucking is providing sufficient competitive constraints to justify leaving an exemption in place, adjusted slightly to use a range (30-50%) rather than a simple demarcation.

This three-part screen is not intended to create an irrebuttable presumption in favor of an exemption or a revocation. Individualized data will be needed. The ICC preferred that national modal share data “be disaggregated to account for variations among corridors.”<sup>34</sup> Indeed, the ICC took a deep dive into the data to examine truck/rail shares for 2,450 separate origin/destination pairs or corridors over which the commodities move in varying numbers; or a potential 600,000

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<sup>32</sup> *Amstar Corp. v. Great Alabama S. R.R.*, I.C.C. Docket No. 382398 (served Nov. 10, 1987); *see also Aluminum Ass’n v. ACY R. Co.*, 367 I.C.C. 475, 484 (1983) (“We reiterate that not all aluminum has to move by truck for motor carriage to exert competitive pressure on the railroads.”); *Consolidated Papers, Inc. v. Chicago & N. W. Transp. Co.*, 7 I.C.C. 2d 330, 337-38 (1991) (trucks provided effective intermodal competition where 55% of issue traffic moved via truck).

<sup>33</sup> *E.g., Colo. Interstate Gas Co. v. Natural Gas Pipeline Co. of Am.*, 885 F.2d 683, 694 n.18 (10th Cir. 1989) (to establish “monopoly power, lower courts generally require a minimum market share of between 70% and 80%”); *Exxon Corp. v. Berwick Bay Real Estates Partners*, 748 F.2d 937, 940 (5th Cir. 1984) (per curiam) (“[M]onopolization is rarely found when the defendant’s share of the relevant market is below 70%.”); *United States v. Dentsply Int’l, Inc.*, 399 F.3d 181, 187-88 (3d Cir. 2005) (“[A] share significantly larger than 55% has been required to establish prima facie market power” and a market share between 75% and 80% of sales is “more than adequate to establish a prima facie case of power.”); *Bailey v. Allgas, Inc.*, 284 F.3d 1237, 1250 (11th Cir. 2002) (a “market share at or less than 50% is inadequate as a matter of law to constitute monopoly power”); *Blue Cross & Blue Shield United of Wis. v. Marshfield Clinic*, 65 F.3d 1406, 1411 (7th Cir. 1995) (Posner, C.J.) (“[50%] is below any accepted benchmark for inferring monopoly power from market share.”); *United States v. Aluminum Co. of America*, 148 F.2d 416, 424 (2d Cir. 1945) (A market share of 90% “is enough to constitute a monopoly; it is doubtful whether 60 or 64% would be enough; and certainly 33% is not.”).

<sup>34</sup> *Rail General Exemption Authority – Miscellaneous Manufactured Commodities*, 1988 WL 225776 (ICC served Jan 29, 1988).

corridor/commodity flows. *Id.* This deeper analysis explored whether the national truck/rail market shares were masking competitive issues. The IQR analysis by Dr. Israel is an alternative way to use exploratory data analysis tools to explore that theory. But in the individualized determination seeking to revoke an exemption, parties could address the intermodal competitive influences revealed by the FAF truck/rail market share data.

B. The Waterfall Infuses the Dashboard with Traditional Statistical Tools and Bedrock Economic Principles.

OE is proposing exploratory data analysis as a tool for the Board to employ when asked to grant or revoke an exemption request. This is commendable. Exploratory data analysis “isolates patterns and features of the data and reveals these forcefully to the analyst.”<sup>35</sup> John Tukey, the creator of this flexible data analysis, described exploratory data analysis as “detectives work.”<sup>36</sup> As he observed, detectives search for evidence while the evaluation of the strength of that evidence is for juries and judges.<sup>37</sup> “Exploratory data analysis is detective in character. Confirmation data analysis is judicial or quasi-judicial in character.”<sup>38</sup> “Exploratory data analysis can never be the whole story,” Tukey warns, “but nothing else can serve as the foundation stone—as the first step.”<sup>39</sup>

OE can improve this foundation stone in two ways. First, exploratory data analysis can benefit from an infusion of more traditional statistical tools. As Tukey observed, “exploratory and confirmatory can—and should—proceed side by side.”<sup>40</sup>

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<sup>35</sup> Hoaglin, Monsteller & Tukey, UNDERSTANDING ROBUST AND EXPLORATORY DATA ANALYSIS, at 1 (1983).

<sup>36</sup> Tukey, EXPLORATORY DATA ANALYSIS, at 1 (1977).

<sup>37</sup> *Id.* at 3.

<sup>38</sup> *Id.*

<sup>39</sup> *Id.*

<sup>40</sup> *Id.* at vii.

Second, the exploratory data analysis must be informed by an understanding of its purpose. “If a detective has no fingerprint powder, he will fail to find fingerprints on most surfaces. If he does not understand where the criminal is likely to have put his fingers, he will not look in the right places.”<sup>41</sup> Exploratory data analysis uninformed by economic knowledge of where competition will be detected will leave the Board adrift in a sea of data.

The second-generation framework proposed by Dr. Israel does both. It infuses the analysis with confirmatory tools where appropriate, such as his hypothesis testing of the average R/VC level. It adds more exploratory data analysis tools, like the IQR method, to explore the interplay between the FAF data and the CCWS. Dr. Israel also recommends using regression techniques to bolster the various assumptions within the GMIM.

Finally, Dr. Israel directs the investigation to where the fingerprints of competition will be discovered. OE’s analysis dusts for prints in changes in R/VC, RPC, and length of haul. The usefulness of exploring that data is debatable. Rather than cast about indiscriminately, economic knowledge recommends the analysis start by dusting the murder weapon—the truck/rail modal shares. And just as a detective would systematically work through all available evidence, other relevant evidence should be explored, including product and geographic competition. Yet relative modal shares should be the “first step” and the foundation stone for any data analysis (exploratory or confirmatory) that seeks to glean information about the current state of competition.

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<sup>41</sup> *Id.*

C. The Waterfall Focuses on the Current Competitive Environment.

A central recommendation by Dr. Israel is to focus the exploratory data analysis on the current competitive environment. “The tests should be designed to evaluate and test *current* competition. Metrics based on changes in competitive indicators over many years do not measure current competition and should be avoided.”<sup>42</sup>

Exploring changes in prices over time may seem useful, but it will lure the agency into dangerous waters because there is no way to hold constant all the procompetitive reasons that could cause inflation-adjusted transportation prices to rise or fall. The AAR details the countless ways the railroad industry has transformed itself since 1992. A great deal has changed since 1992, when President George H.W. Bush signed NAFTA, the Dow Jones Industrial Average closed at 3301, the cost of a gallon of gas was \$1.05, and AT&T released a video telephone for \$1,499.

Any time-series analyses over three decades would need to compare a full competitive analysis at the time of the exemption to a full competitive analysis of current conditions before it could offer any insight into whether there have been significant changes. This would be a “daunting exercise.”<sup>43</sup> As Dr. Israel explains, any analysis of changes must “control for all the reasons a change might have occurred – shifts in demand, productivity, traffic mix, increasing congestion, etc.”<sup>44</sup> Given the herculean task of controlling for all those factors, Dr. Israel recommends

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<sup>42</sup> Israel V.S. at ¶ 10.

<sup>43</sup> *Id.* at ¶ 45.

<sup>44</sup> *Id.*

the STB focus its resources “on a thorough analysis of current conditions [as] a more reliable method for assessing competitive conditions.”<sup>45</sup>

It might be tempting to explore just changes in truck/rail shares over time, but that too is not informative. “The ability of the railroads to increase market shares by attracting traffic from competitors represents, in fact, the antithesis of the abuse of market power.”<sup>46</sup>

D. The Waterfall Aligns the Dashboard to Familiar Components of Competition.

Eventually, exploratory data analysis must surrender the battlefield to a more robust “confirmation” analysis by the STB. In other words, at some point the agency will need to move from detective work to adjudicatory work. At that point, it will have to test the hypothesis of whether competition in all its varied forms has diminished to such a large degree that the STB should resurrect federal regulation over transportation that has been unregulated for decades.

To facilitate that confirmation analysis, the Competitive Influence Waterfall aligns the inquiry into the four familiar components of competition: intermodal competition, intramodal competition, geographic competition, and product competition. This is sound as a matter of economics, as these are well-established constraints on railroad pricing. It is sound as a matter of law—because the STB is “not writing on a blank slate” it must address the competition factors the ICC found justified the original exemptions.<sup>47</sup> And it is sound for practical reasons, guiding the inquiry into familiar territory will help all stakeholders understand how to

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<sup>45</sup> *Id.*

<sup>46</sup> *Rail General Exemption Authority – Miscellaneous Manufactured Commodities*, 1988 WL 225776 (ICC served Jan 29, 1988).

<sup>47</sup> *Dep’t of Homeland Security v. Regents of the Univ. of Cal.*, 140 S.Ct. 1891, 1915 (2020); *Motor Vehicle Mfrs. Ass’n of the U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983).

overcome—with individualized evidence—what is revealed by the Competitive Influence Waterfall.

E. The Waterfall Curtails Reliance on R/VC Ratios.

“R/VC ratios do not provide a reliable measure of changes in captivity over time.”<sup>48</sup> This observation has been confirmed by the Christensen Study,<sup>49</sup> the independent Transportation Research Board report,<sup>50</sup> peer reviewed literature,<sup>51</sup> and a parade of esteemed economists before the STB.<sup>52</sup>

The reasons are many. R/VC is an accounting measure, not an economic measure. It is not an accurate measurement of costs that are truly variable. Indeed, even if economic margin could be accurately measured, competition authorities shy away from using this metric in an industry with high fixed costs, shifting demand, and congestion.<sup>53</sup>

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<sup>48</sup> STB Comments to GAO (2006).

<sup>49</sup> “R/VC, aggregated by commodity and county . . . should not serve as a stand-alone measure of market-dominant behavior,” because it is “in fact weakly correlated with railroad and water competition measures.” As the Study explains, the R/VC ratio “inextricably combines local market structure factors with various other cost and demand-related factors,” and is not even methodologically consistent year-to-year, making comparisons over time unreliable. *See supra* note 12 at 11-26.

<sup>50</sup> *See* The National Academies of Sciences, Engineering, Medicine, Transportation Research Board, Committee for a Study of Freight Rail Transportation and Regulation, *Special Report 318: Modernizing Freight Rail Regulation*, Washington, DC (2015), available at <http://www.trb.org/Main/Blurbs/172736.aspx>.

<sup>51</sup> *E.g.*, Robert H. Bork & J. Gregory Sidak, *The Misuse of Profit Margins to Infer Market Power*, 9 J. OF COMP. L. & ECON. 511, 512 (2013) (“Significant concerns attend the use of a firm’s profit margin to infer its market power.”); Office of Fair Trading, *Assessment of Market Power: Understanding Competition Law* § 6.6 (2004) (“High prices or profits alone are not sufficient proof that an undertaking has market power.”).

<sup>52</sup> *See, e.g.*, Statement of Professor Robert D. Willig in AAR Comment, Review of Commodity, Boxcar, and TOFC/COFC Exemptions, EP 704 (Sub-No. 1) (filed Jan. 31, 2011).

<sup>53</sup> *See* Israel V.S. at ¶¶ 33-40.

Moreover, this metric is a poor reflection of productivity gains.<sup>54</sup> If a railroad charges \$15 to haul a car with a variable cost of \$10, the movement will have a R/VC ratio of 150%. Assume the variable cost falls to \$5 (due to a large capital investment) and robust competition forces the railroad to share the productivity gain with its customers by lowering the rate to \$12.5. Everything about this illustration is procompetitive. Yet the R/VC ratio will skyrocket to 250%. This dramatic rise in R/VC level does *not* demonstrate a change in market power or a change in captivity over time, but flows from the rough and tumble of a robust competitive marketplace.

Congress understood the inherent limitation of this metric and how easily a change in R/VC ratios could be misunderstood. It therefore *prohibited* the Board from drawing any inference about market power from the fact that R/VC ratios are above the 180% jurisdictional threshold. 49 U.S.C. § 10707(d)(2). Congress intended for R/VC ratios to be used in a gatekeeping function, where movements with ratios below 180% are, by law, found to establish that the carrier “does not have market dominance over the transportation to which the rate applies.” It then expressly permitted no other inferences. *Id.* (“A finding by the Board that a rate . . . is equal to or greater than 180 percent does not establish a presumption that such rail carrier has or does not have market dominance over such transportation.”).

Therefore, the Competitive Influence Waterfall limits an analysis of R/VC ratios to the role contemplated by Congress: a gatekeeping function to prevent the agency from injecting itself into well-functioning and competitive subsectors of the transportation market. Once through that gate, Dr. Israel leaves R/VC ratios behind and moves on to more instructive inquiries of whether sufficient competition

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<sup>54</sup> See *id.* at ¶ 35.

in all its varied forms exists to justify resurrecting federal regulation over subsectors that have been unregulated for decades.

## **V. Conclusion**

NS encourages the STB to continue down the path of data-driven policymaking. While a useful first step, exploratory data analysis can plumb data for useful information but cannot decide the outcome of a formal proceeding. Ultimately, the analysis must move from detective work to the judicial task of deciding whether the record supports granting or revoking an exemption under the legal standard that urged exemptions “to the maximum extent” possible. 49 U.S.C. § 10502(a).

The STB should not be alarmed if a data-driven inquiry casts grave doubts on the wisdom of reregulating *any* existing exempt commodity. In 1980, Congress took the first step to remove a regulatory chokehold on the railroad industry because robust competition from the trucking industry made federal regulation unnecessary and unwise. The ICC took the important second step, exempting broad swaths of traffic from regulation because of ubiquitous intermodal, intramodal, product, and geographic competition.

Nothing has changed. Government statistics confirm that trucks remain the dominant mode of intercity transportation in the United States. The rise of interconnected global markets has only increased the competitive constraints that product and geographic competition place on the railroads. The restored financial health of the freight railroads is the result of billions of dollars in capital investments to improve productivity and service. And customers in these exempt, unregulated subsectors have flourished.

A next-generation framework will confirm these facts and demonstrate that there is no basis for the STB to resurrect superfluous regulation over these competitive transportation sectors.

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Dated: January 29, 2021

**BEFORE THE  
SURFACE TRANSPORTATION BOARD**

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**REVIEW OF COMMODITY, BOXCAR, AND TOFC/COFC EXEMPTIONS**

Docket No. EP 704 (Sub-No. 1)

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**VERIFIED STATEMENT OF**

**MARK A. ISRAEL, Ph.D.**

**January 29, 2021**

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## **I. INTRODUCTION AND SUMMARY OF CONCLUSIONS**

### **A. QUALIFICATIONS**

1. My name is Mark A. Israel. I am a Senior Managing Director at Compass Lexecon, an economic consulting firm where I have worked since 2006. I am the head of Compass Lexecon's North American antitrust business. From 2000 to 2006, I served as a full-time member of the faculty at Kellogg School of Management, Northwestern University. I received my Ph.D. in economics from Stanford University in 2001.

2. I specialize in the economics of industrial organization—which is the study of competition in imperfectly competitive markets, including the study of antitrust and regulatory issues—and applied econometrics. At Kellogg and Stanford, I taught graduate-level courses covering topics including business strategy, industrial organization/competition economics, and econometrics. My research on these topics has been published in leading peer reviewed economics journals including the American Economic Review, the Rand Journal of Economics, the Review of Industrial Organization, Information Economics and Policy, and the Journal of Competition Law and Economics, among many others.

3. My work at Compass Lexecon has focused on the application of economic theory and econometric methods to competitive analysis of the impact of mergers, antitrust issues including a wide variety of single-firm and multi-firm conduct, class certification, and damages estimation. I have analyzed these competition issues on behalf of a wide range of clients, including private companies and government entities. I have submitted expert reports, declarations, and affidavits to government agencies and federal and state courts. I have testified in federal court, multiple state courts, and in many regulatory and arbitration proceedings in the U.S. and other countries. I have presented competitive analyses to the U.S. Department of Justice and the Federal Trade Commission on dozens of occasions. My work has included analysis of competition in many transportation-related cases, including previous submissions to the Surface Transportation Board ("STB" or "the Board"), as well as cases involving airlines, barges, food distribution, and many others. My curriculum vitae is attached as Exhibit A.

## B. ASSIGNMENT

4. I have been asked by Norfolk Southern (“NS”) to provide comments on the method for evaluating requests for exemption revocations presented by the Board in its September 29, 2020 decision in EP 704 – Review of Commodity, Boxcar, and TOFC/COFC Exemptions (hereinafter “2020 Request for Comments”).<sup>1</sup> Specifically, I respond to the Board’s request for comments on whether the method developed by the Office of Economics (“OE”) and outlined in the 2020 Request for Comments—which I refer to in this statement as the “dashboard method”—provides a “useful analysis” and is a “helpful tool for evaluating market conditions.”<sup>2</sup>

5. I also offer modifications to the dashboard method and suggest additional analyses that augment the new approach and provide the Board with tools to evaluate policy decisions regarding the ability to rely on marketplace competition or the need for regulation. While I present these modifications in the context of how they should be applied in evaluating potential exemption revocations, they can also be applied in the context of evaluating new exemptions. I recognize that no method is perfect. My intention is to work toward a set of tools that can assist in the systematic evaluation and hypothesis testing necessary for all decisions about regulation and related policy and I welcome further dialog about the proposal I offer in this statement.

## C. SUMMARY OF CONCLUSIONS

6. I reach the following conclusions.

7. First, the proposed dashboard method provides a useful step toward the application of systematic, rigorous tools to the analysis of competition faced by railroads for particular movements, for use in evaluating rate regulation and related policy issues, including but not limited to consideration of exemption revocation. In general, such systematic, step-by-step analysis is the only way to ensure that all potential sources of competition are evaluated, with a finding that none of the sources of competition sufficiently constrain rates required before turning to the economic and legislative last resort of regulation.

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<sup>1</sup> Surface Transportation Board, Docket No. EP 704 (Sub-No. 1), Review of Commodity, Boxcar, and TOFC/COFC Exemptions, *Decision*, decided September 29, 2020 (hereinafter, “2020 Request for Comments”).

<sup>2</sup> 2020 Request for Comments at 6.

8. Second, while the proposed dashboard method provides many useful tools for exploratory data analysis—to evaluate patterns in the waybill data for example—it falls short of a robust decision-making tool for regulators because it fails to consider sufficient sources of information and it fails to use that information to test hypotheses regarding competition. The lack of hypothesis testing is a major shortcoming of the proposed method: Ultimately, the decision to revoke an exemption or regulate a rate is a decision to abandon a market solution in favor of a regulatory one, something economics and the relevant legislation indicates should be avoided wherever possible and thus something that requires clear rejection of the hypothesis that competition constrains rates before imposing.

9. Third, the proposed dashboard method fails to incorporate all the relevant sources of competition, focusing too narrowly on what can be learned about rail-on-rail competition from the waybill data and on rough, limited indicators of competition with other modes of transportation. Before imposing the severe remedy of exemption revocation or rate regulation, the hypothesis of competition from other modes needs to be rejected. The associated analysis must include robust analysis of all relevant forms of competition, including competition from the ability to ship to or from other geographies that have other competitive shipping options, or from downstream competition faced by the products at question, which constrains the ability to raise costs faced by those products.

10. Fourth, as to specific steps that need to be taken to move from a method for exploratory analysis to a decision-making tool for regulators:

- The RVC screen should be applied in a way that tests the hypothesis that average rail rates for the commodities (or shipments) at issue are at or below the 180 jurisdictional threshold, requiring clear rejection of that hypothesis before the last resort of rate regulation is even considered. Only in this way can the waybill *sample* provide sufficient certainty that the jurisdictional threshold established by Congress has been met. And given the well-known infirmities in the variable cost measure used in RVC—and the general limitations of using accounting margins to measure competition, particularly in industries with high capital costs—RVC levels should only be used in this initial screening step, not for any further competitive analysis.

- A second screen, based on modal shares, should also be applied. To the extent rail movements face significant competition from other modes of transportation—including truck and barge—then there is no basis to abandon the market and impose regulation. Only if the presence of such competition can be rejected should regulation (including via exemption revocation) even be considered.
- If these two screens are met, a third step, based on the waybill and other relevant data, should be undertaken to assess fully whether there are viable sources of market competition. Of note here:
  - The tests conducted using such data should be grounded in economic theory and empirical evidence on what metrics are relevant. Arbitrary rules, which either do not consider relevant competition (e.g., mileage-based rules for modal competition, which do not consider all the geographic options for the source or origin of the shipment) or have no empirical basis (e.g., arbitrary mileage cutoffs without a showing that those cutoffs are correlated with rates) should be avoided.
  - The tests should be designed to evaluate and test *current* competition. Metrics based on changes in competitive indicators over many years do not measure current competition and should be avoided.
  - Relative comparisons of changes for particular commodities to average changes of other commodities are particularly misleading, as they do not account for differences in the initial competitiveness of the commodities nor how the mix of commodities included in the averages changes over time. If any comparisons to previous years are included, these should be based on full competitive analyses of each year on its own—not changes in particular competitive indicators one at a time—and they should look at several years together as a comparison to make sure there is sufficient data and avoid one-year outlier results.
  - Similarly, analyses of current competitive conditions should use data from several years to ensure there is sufficient data to capture sources of competition and to avoid outlier results from a single year.
  - More details on specific tests implementing these principles are provided below.

- If any of the first three steps find competitive options, regulation is not warranted, as economics teaches—and legislation prescribes—that the goal should be to let the market operate where possible.
- If none of those steps find sufficient competitive options, then the possibility of geographic competition (other origin or destination options that do have competitive alternatives) or product competition (downstream competition that constrains the ability to raise a product’s costs/prices) must be considered. Because such competition occurs in geographic and product markets for the commodities at issue, the shippers of those commodities possess the relevant data and information necessary to do such analyses. As such, shippers should be required to produce relevant information—described in more detail below—with that information sufficient to reject the hypothesis of significant geographic or product market competition before regulation (or exemption revocation) is imposed.

11. The steps described above and detailed below are designed to provide a systematic process to examine and test whether there is sufficient competition such that regulation is not warranted. While this thorough, systematic approach improves on OE’s dashboard by more fully accounting for competition and implementing the economic and legislative standard that competition should be preferred to regulation where possible, it nevertheless inherits the limitations in available data—particularly RVC screens, but also modal shares, the waybill sample, etc.—and cannot overcome the fact that there can be no formulaic “cookbook” approach to assessing competition. As such, this framework can provide tests and indicators to inform the analysis, but it cannot replace a deeper dive into the relevant facts of the case, nor prevent stakeholders from seeking to demonstrate why the steps presented here point to the wrong outcome. Ultimately, the approach here seeks a middle ground, not rejecting the use of available screens and data altogether, but rather using them as fully as possible while recognizing their clear limitations and thus the need for additional analysis and the opportunity to refute the implications of the tests.

## **II. BACKGROUND**

### **A. THE NATIONAL RAIL TRANSPORTATION POLICY AND THE IMPORTANCE OF AND PRECEDENT FOR FULLY CONSIDERING ALL FORMS OF COMPETITION**

12. The National Rail Transportation Policy (“RTP”) states: “In regulating the railroad industry, it is the policy of the United States Government...to allow, to the maximum extent possible, competition and the demand for services to establish reasonable rates for transportation by rail.”<sup>3</sup> Consistent with this policy, Congress provided regulators with the power to issue exemptions from regulation in instances where shippers do not need regulatory protection because competition is sufficient to discipline rates and guard against the abuse of market power.<sup>4</sup>

13. The question of whether competition is sufficient to discipline rates or whether regulation is necessary to guard against the potential abuse of market power is an economic question that must be evaluated using well-established analytical principles and grounded in data. This requires policy makers to conduct a full competitive analysis of all relevant competitive alternatives, which includes intermodal and intramodal options, geographic alternatives and/or substitute products.

14. Indeed, when the Interstate Commerce Commission (“ICC”), the predecessor agency to the STB, evaluated requests for exemptions, it conducted detailed competitive assessments that explicitly examined all competitive alternatives, including the extent of intramodal alternatives, intermodal market shares, and the influence of geographic and product alternatives. For example: the ICC cited modal market shares as a factor supporting the exemption of crushed stone (STCC 14-2)<sup>5</sup> and primary iron and steel products (STCC 33-12)<sup>6</sup>; it found product competition a factor

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<sup>3</sup> 49 USC § 10101.

<sup>4</sup> 49 USC § 10502.

<sup>5</sup> See Rail General Exemption Authority – Petition Of AAR to Exempt Rail Transportation Of Selected Commodity Groups, 9 I.C.C.2d 969 (September 17, 1993), at 4.

<sup>6</sup> See Rail General Exemption Authority – Petition Of AAR to Exempt Rail Transportation Of Selected Commodity Groups, 9 I.C.C.2d 969 (September 17, 1993), at 7.

in exempting coke from coal (STCC 29-914)<sup>7</sup>; and it cited “exceptionally strong”<sup>8</sup> geographic competition in exempting iron or steel scrap (STCC 40-211) and “extensive”<sup>9</sup> geographic competition with respect to hydraulic cement (STCC32-4).

15. A decision to revoke an exemption must be grounded in a similarly systematic competitive analysis that establishes—using statistical hypothesis testing where possible—that these forms of competition are not sufficient to discipline rates and regulation is necessary to guard against the exercise of market power. This necessarily requires that the Board have tools to gather and analyze data, and that the Board have methods that allow it to assess whether the evidence supports a finding of market power.

#### **B. EP 704**

16. In 2011, the Board initiated EP 704 – Review of Commodity, Boxcar, and TOFC/COFC Exemptions “to explore the continued utility of, and the issues surrounding” the existing commodity, boxcar, and intermodal exemptions.<sup>10</sup>

17. In 2016, the Board issued a Notice of Proposed Rulemaking (“NPRM”) which proposed revoking exemptions for crushed or broken stone or rip rap; coke produced from coal; primary iron or steel products; hydraulic cement; and iron or steel scrap, waste or tailings. In response to this NPRM, the Board received comments from shippers, railroads, and government interests, including comments raising concerns about the method, which relied primarily on analysis of revenue-to-variable cost (“RVC”) metrics, which the Board used as the basis for the proposed revocations.

#### **C. OFFICE OF ECONOMICS’ PROPOSED APPROACH**

18. Following the comments received in 2016 and ex parte meetings held in 2019, the Board issued a decision in September 2020 (the 2020 Request for Comments) presenting a new method

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<sup>7</sup> See Rail General Exemption Authority – Petition Of AAR to Exempt Rail Transportation Of Selected Commodity Groups, 9 I.C.C.2d 969 (September 17, 1993), at 6.

<sup>8</sup> Surface Transportation Board, Docket No. EP 704 (Sub-No. 1) Review of Commodity, Boxcar, and TOFC/COFC Exemptions, Decision, (March 23, 2016) at 6.

<sup>9</sup> Rail General Exemption Authority – Exemption of Hydraulic Cement, EP 346 (Sub-No. 34) 10 ICC 2d 649 (July 26, 1995) at 3-4.

<sup>10</sup> *2020 Request for Comments* at 2.

(the dashboard method) for evaluating exemptions or exemption revocations. This dashboard method was developed by OE at the Board’s request. In the 2020 Request for Comments, the Board reiterated its commitment to “ensuring that a robust analysis be conducted when determining whether to proceed with any commodity exemptions or exemption revocations” and requested comments on the new proposal.<sup>11</sup>

19. The Board described the approach developed by OE as a method “to help the Board evaluate market conditions by taking into account a variety of metrics related to or indicative of rail transportation competition”<sup>12</sup> and said the approach intends to focus on “developing a snapshot of the current state of a commodity’s rail transportation market,” “identifying changes in market conditions,” and “considering certain potential influences from alternative transportation modes that could impact that market.”<sup>13</sup>

20. OE conducted a technical conference on December 18, 2020 and reconvened the conference on January 15, 2021. At that conference, OE staff provided some information regarding the data used and the technical steps taken to implement the new approach. Prior to the technical conference, NS submitted several questions, including questions seeking clarification regarding the methods OE employed to determine various thresholds presented in its approach, whether any of the thresholds was designed to test a specific hypothesis, and/or whether OE had relied on any statistical methods in designing the proposed approach. In response to these questions, OE noted that the proposed approach was not intended as a tool to test statistical hypotheses, nor to draw specific conclusions about the presence or absence of market power. Rather, OE noted that the proposed approach was developed using the principles of Exploratory Data Analysis (“EDA”) and, accordingly, was designed as a tool to aggregate and summarize data.

21. EDA is a well-known approach to data analysis that is not intended to test formal statistical hypotheses, but rather to allow analysts to explore data and tease out patterns, identify outliers and anomalies, explore relationships between variables, and generally gain insight into a

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<sup>11</sup> 2020 Request for Comments at 5.

<sup>12</sup> 2020 Request for Comments at 6.

<sup>13</sup> 2020 Request for Comments at 6.

dataset.<sup>14</sup> EDA often uses various data visualization techniques as a method for exploring data and identifying patterns and relationships in data. The Board included examples of data visualization methods used by OE in the dashboard proposal. These visualizations—and EDA more generally—can be a useful step for exploring data but they are not designed to test hypotheses or draw firm inferences from the data. For this reason, EDA is generally viewed as a complement to more traditional statistical analyses that are designed to determine what inferences can be drawn from particular data samples, using standard hypothesis testing tools.<sup>15</sup> This is a useful distinction to bear in mind in assessing whether and how the approach outlined in the 2020 Request for Comments can be used by the Board as the foundation for its policy decisions.

### III. THE DASHBOARD METHOD

22. In the 2020 Request for Comments, the Board requests comments on whether the method outlined in the 2020 Request for Comments provides a “useful analysis” and is a “helpful tool for evaluating market conditions.”<sup>16</sup>

23. OE’s method includes two initial indicators tied to RVC distribution and intermodal traffic, a geographic model that seeks to evaluate the extent of rail and water alternatives, and additional analysis of the Confidential Carload Waybill Sample (“CCWS”). These components feed into an “indicator dashboard” that includes ten total metrics—the two initial screen indicators; two indicators drawn from the geographic model and CCWS analyses that indicate the extent of rail, water, and truck influences; two indicators related to rail length-of-haul; and four indicators that use various RVC metrics. The indicators are used to determine a collective ‘overall dashboard signal,’ which signals whether these data suggest a weak, strong, or moderate case for revocation (or, conversely invocation) of exemptions.<sup>17</sup> I refer to this approach as the “dashboard method.”

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<sup>14</sup> Tukey, John W., *“Exploratory Data Analysis,”* Addison-Wesley Publishing Company, 1977 (hereinafter “*Tukey*”) at vi-vii and 1-3.

<sup>15</sup> *Tukey* at vi-vii.

<sup>16</sup> *2020 Request for Comments* at 6.

<sup>17</sup> *2020 Request for Comments* at 9-13.

24. In general, OE’s effort to develop a method for evaluating exemptions that is based on reliable data and analysis is commendable. The method developed by OE is a first step in developing a systematic, rigorous, data-based, quantitative approach to analyzing competition and assessing exemptions. However, additional steps are needed to develop a full, rigorous analysis, which is the only way to ensure that all sources of competition are considered in a systematic way. In particular, some aspects of the dashboard method limit its usefulness as a “tool for evaluating market conditions.”

25. First, the dashboard method presents the Board with various avenues to explore data, but it does not draw on any statistical methods that allow the Board to evaluate the strength of the evidence and determine what inferences and conclusions can be drawn from it. To be useful as a tool for making bottom line determinations about regulation, any method must include tools that provide the Board the ability to test different hypotheses and make decisions based on data. Given the policy that competition should be relied upon “to the maximum extent” possible, a move to impose regulation—in this context, to revoke an exemption that was granted based on evidence that competition restrains rates—requires clear rejection of the hypothesis that competition constrains rates.

26. Second, although the proposed approach introduces some new analyses, the dashboard method continues to rely extensively on RVC as an indicator of market power. RVC remains an unreliable indicator of market power and its use in exemption proceedings—or as a tool for assessing competition in general—should be limited to serving as a screen for determining STB jurisdiction for the purposes of rate regulation. If the RVC screen is not clearly above 180, analysis should stop. If it is sufficiently above 180 to indicate STB jurisdiction for rate regulation, the analysis should move beyond RVC to a detailed assessment of additional evidence.

27. Third, the dashboard method fails to incorporate data sufficient to permit a thorough consideration of intermodal competition. The dashboard method relies almost exclusively on railroad industry data—primarily the CCWS—and, as a result, uses only rough and limited indicators of intermodal alternatives. For example, both truck and waterborne alternatives are assessed relative to characteristics of an incumbent rail lane without any consideration of any data on overall modal shares for a given commodity. A thorough analysis of intermodal competition must incorporate modal share data which, as I discuss below, is available from the

Federal government. The hypothesis that competition is sufficient to raise rail rates cannot be rejected without a proper examination of intermodal competition, including intermodal shares.

28. Fourth, OE's proposed method for identifying direct rail-to-rail competition focuses too narrowly on replicating the incumbent rail lane rather than on identifying economically viable alternatives for a particular shipper or destination, even if those alternatives do not exactly mirror an existing lane, either because they originate or terminate in a different location, or because they do not currently move the specific commodity under review in the same lane. The ability to expand an existing lane to ship additional commodities, the ability of shippers to access other geographies that have competitive transportation alternatives, and the presence of downstream competition faced by the products in question all constrain rail rates. The hypothesis that competition is sufficient to raise rail rates cannot be rejected unless these sources of competition are fully analyzed.

29. Finally, the "overall dashboard signal" is just an *ad hoc* score, which is not grounded in economic theory or the logic of relying on competition and avoiding regulation wherever possible and thus does not provide clear guidance on the proper decision. To rectify this, a superior method would work through a series of steps, each of which would evaluate a potential source of competition to determine if it is sufficient to eliminate the need for regulation. If the competition considered at a specific step is sufficient, regulation is not warranted and no further analysis is required. Only if all steps fail to find sufficient competition (or a shipper is able to refute the finding of competition at a particular step with sufficient additional evidence) could there be a case to revoke an exemption or otherwise impose regulation.

30. In the following section I discuss some of these limitations in more detail and suggest modifications and extensions to the dashboard method that move the analysis from a method for exploratory data analysis to a step-by-step decision-making tool. These modifications and extensions incorporate and build on relationships identified in the OE approach and are consistent with the types of competitive analyses that are commonly done in other regulatory contexts.

#### **IV. ADDITIONAL PROPOSALS**

31. In this section, I walk through a four-step procedure to test for the presence of competition, such that regulation (including via exemption revocation) is not warranted. Step 1

tests whether the average RVC is over 180. If step 1 shows a high enough RVC, the analysis goes on to step 2, which considers whether competition from other modes can be shown to be strong enough to demonstrate substantial competition from other modes. If step 2 fails to demonstrate sufficiently strong intermodal competition, the analysis goes on to step 3, which evaluates competition for the movements in question in more detail, relying on the waybill data and the dashboard's Geographic Modal Influence Model ("GMIM") to study intra- and intermodal competition. Finally, if step 3 fails to show sufficient competition, Step 4 proposes a set of questions and data requests to be sent to shippers to permit a deeper dive into geographic and product competition. If all steps fail to show sufficient competition, this provides an indication that regulation may be warranted, although, as noted above, at no point should the data analysis be seen as prescriptive, nor to eliminate the need for a more complete analysis, in which all interested parties have the ability to explain why the data analysis steps have led to the wrong conclusion.

#### A. **RVC SCREEN**

32. In the 2020 Requests for Comments, the Board notes that the development of the dashboard method was based, in part, on concerns with using RVC as a measure of market power.<sup>18</sup> Unfortunately, the dashboard proposal does not fully address these concerns. Although the dashboard method incorporates some additional data and uses RVC in different ways, RVC remains a key variable in the competitive analysis proposed by OE. RVC is the basis for five of the ten indicators that contribute to the overall dashboard indication as to whether there is a weak, moderate, or strong indication for regulatory intervention.<sup>19</sup> This is far too much reliance on what remains, at best, a rough initial screen.

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<sup>18</sup> 2020 Request for Comments at 3-4, 5-6.

<sup>19</sup> RVC is the basis for one of the two 'initial indicators' that can, under certain proposed conditions, establish an overall dashboard score that eliminates the need for analysis of additional indicators. RVC is also the basis four (of eight) additional indicators in the 'indicator dashboard' that combine to establish an 'overall dashboard indication' in cases where an initial indicator did not establish an overall dashboard score.

1. **RVC is not a reliable indicator of market power and should be used only as a jurisdictional screen**

33. The challenges of using RVC as an indicator of market power are well documented.<sup>20</sup> For all the reasons that have been raised previously (and that I outline below), RVC continues to be an unreliable indicator of market power for the following reasons.

34. First, RVC is an accounting measure that includes accounting costs (such as fuel and labor, for example), but that does not include important economic costs that must be reflected in any economic measure of margin. For example, RVC does not include any costs associated with increased congestion and potential delays that come with adding an additional move to the rail network – a factor that is increasingly important in an era of increased congestion, and which affects particular commodities and movements more than others and thus which may explain different changes in RVC measures. Nor does RVC incorporate a competitive return on capital investments. These are real costs that railroads must recover, which, as a matter of economics, affect railroad prices, particularly in the longer term, and thus that are reflected in railroads revenues. Omitting these costs from the RVC calculation means that the variable cost component of RVC is incomplete, does not provide reliable information about profitability, and cannot be used as an indicator of market power.

35. RVC also may not properly reflect productivity improvements because the method that the rail costing system (URCS) relies on to generate system-wide averages has not changed significantly since its inception in 1989. Thus, the variable cost component of RVC is unlikely to properly incorporate changes in rail costs related to productivity gains since that time. To the extent that productivity has improved, it is well known that RVC could go up considerably even if those productivity gains were fully passed through to shippers. For example, if revenues of \$180,000 and costs of \$100,000 fell to \$150,000 and \$70,000 due to productivity gains (a fully passed through \$30,000 improvement), RVC would increase from 180 to 214, even though shippers would be much better off with the change.

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<sup>20</sup> Transportation Research Board, Committee for a Study of Freight Rail Transportation and Regulation, “*Special Report 318: Modernizing Freight Rail Regulation*,” The National Academies of Sciences, Engineering, Medicine, Washington, DC, 2015 (hereinafter “*TRB Report*”) at 112-119.

36. It is also important to note that the variable cost component of RVC is not an accurate measure of costs that are truly variable and does not accurately reflect the actual costs incurred on a specific movement. For example, variable cost includes certain fixed costs (such as investments in capital and road property, for example) at a default level of 50 percent.<sup>21</sup> And movement-specific variable costs are based on system-wide average costs (for example, the system-wide average equipment rental for a car), rather than the actual expense for a particular shipment.<sup>22</sup> This means that higher shipment-specific costs (such as for logistically difficult moves, or moves on a congested line, or moves that required additional capital investment) will drive increased prices and revenues but the variable cost used to calculate RVC will reflect lower systemwide averages, thus resulting in high RVC for reasons that have nothing to do with market power.

37. Allocating costs is an inherently challenging exercise with certain costs not amenable to meaningful shipment-specific allocations. For example, allocating input costs (e.g. labor, fuel etc.) to specific shipments is prone to error given that each movement can be very different in terms of how much of a given input is being used.<sup>23</sup> Again, this factor points to the need for reliance on RVC only as an initial screen, as specified by Congress, but not as a tool for competitive analysis beyond that.

38. In addition to the fact that RVC for a specific commodity may increase over time for many reasons unrelated to market power, any comparison of changes in RVC for a specific commodity to the change in *average* RVC for other commodities is subject to mix issues. In particular, a change in relative RVC may be linked to a change in the universe of commodities making up the average and be unrelated to increased market power.

39. Finally, even if RVC were a carefully measured economic margin, inferring anything about market power from even a well-constructed economic margin is difficult. In industries such as rail, with high fixed costs, shifting demand, and congestion, margins may need to be high

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<sup>21</sup> See *TRB Report* at 110.

<sup>22</sup> See *TRB Report* at 111.

<sup>23</sup> See *TRB Report* at 107-8.

to generate a competitive return that fully accounts for these costs. The Horizontal Merger Guidelines note<sup>24</sup>:

High margins commonly arise for products that are significantly differentiated. Products involving substantial fixed costs typically will be developed only if suppliers expect there to be enough differentiation to support margins sufficient to cover those fixed costs. High margins can be consistent with incumbent firms earning competitive returns.

40. For all of these reasons, RVC cannot reveal market power overall or on specific shipments and cannot be used as the basis for drawing any meaningful conclusions about competition in the rail industry. Hence, the dashboard method's proposed use of RVC continues to place too much weight on RVC as a reliable measure of competition. Instead, as I discuss in more detail below, RVC should be used only as the basis for an initial screen to establish whether the Board has jurisdiction over the traffic in question.

**2. The RVC indicators proposed in the dashboard method offer no information about current competitive circumstances**

41. The RVC indicators proposed in the dashboard method do not address the fundamental shortcomings of RVC as a measure of market power and do not provide the Board with any reliable tools for assessing whether the competitive circumstances for a given commodity have changed in any meaningful ways.

42. The indicator dashboard uses RVC in four indicators to compare commodity-specific RVCs to all carload RVCs for a particular year<sup>25</sup> and to calculate changes in these RVC metrics between 1992 and 2018.<sup>26</sup> As discussed above, RVC is not a reliable indicator of market power and does not provide any measure of the current competitive circumstances for any commodity.

43. Further, metrics based on changes in RVC over many years do not provide any information for assessing current competitive circumstances and should be avoided. Attributing

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<sup>24</sup> See, U.S. Department of Justice and the Federal Trade Commission, "Horizontal Merger Guidelines," Issued: August 19, 2010 (hereinafter, "*Merger Guidelines*") at fn 3, § 4.1.3 and fn 6.

<sup>25</sup> "All Traffic in Most Recent Year R/VC Indicator" and "Competitive Influence R/VC Difference in Most Recent Year Indicator"

<sup>26</sup> "All Traffic R/VC Change Indicator" and "Competitive Influence R/VC Difference Change Indicator"

any changes in RVC to a shift toward a less competitive market ignores important changes in the rail industry—improvements in equipment and service quality, improvements in productivity, increased congestion, changes in traffic mix—over the 26-year time horizon suggested by the Board. All of these changes can lead to increasing RVCs for reasons unrelated to market power. And without any indication of the degree of competition in the market in the reference year, interpreting what a change in RVC means with respect to current competitive conditions is not possible.

44. Metrics based on relative RVC changes – i.e., the change in RVC for a particular commodity relative to the average change in RVC for all carload traffic – are particularly misleading. These comparisons do not account for differences in the initial competitiveness of the commodity relative to all carload traffic, nor do they account for differences in the mix of commodities included in the comparison group over time. Attributing any change in relative RVC to an increase in market power ignores these factors and is not a sound basis for assessing the competitive circumstances for a given commodity.

45. If the Board is interested in comparing changes over time, comparing a full competitive analysis at the time of the exemption to a full competitive analysis of current conditions might offer some insight into whether there have been significant changes. Any analysis of changes should also consider more than just two years to ensure the changes are not the result of an outlier year, and it must also control for all the reasons a change might have occurred – shifts in demand, productivity, traffic mix, increasing congestion, etc. However, ultimately, little reliance should be placed on a comparison of competitive conditions many years apart: Controlling for all the factors that may have changed is a daunting exercise, and focusing on a thorough analysis of current conditions—as the competition agencies do when conducting competitive analyses, which rarely if ever look back to conditions more than 20 years old—is a more reliable method for assessing competitive conditions.

### **3. RVC should be used only as a jurisdictional screen**

46. Given these limitations, and the Board’s recognition of them, the most appropriate use for RVC is as an initial screen, used simply to determine whether the traffic in question is generally within the Board’s jurisdiction for the purposes of rate regulation. If that screen fails

to demonstrate that the traffic is within the Board’s jurisdiction for rate regulation, there is no need for additional inquiry into the competitive circumstances relevant to a specific commodity.

47. The dashboard method does suggest using RVC as an initial screen—labeling the case for revocation “weak” if less than 5% of a given commodity moves at RVC above 180. Although using RVC as an initial screen makes sense (given its jurisdictional role), the 5% threshold identified in the dashboard method is not based on any statistical analysis and does not provide the Board with a reliable mechanism to decide whether the traffic in question falls within the Board’s jurisdiction for rate regulation. To provide such guidance, one must first determine the relevant RVC metric to analyze and then formulate a testable hypothesis that can be evaluated empirically.

*(a) Mean RVC is the most appropriate measure for an initial screen*

48. For any given commodity there is a wide distribution of RVCs that vary over many dimensions such as shipper, route, type of shipment (e.g. local or interline), type of equipment, type of contract, etc. As such, the observed data is of stochastic nature, and there are not simple deterministic relationships such as a single RVC number for a given commodity. This is a common issue in economics, where economic theory generally posits deterministic relationships, which, when taken to the data to be assessed, must account for observational data and complex stochastic relationships. To bridge the gap between theory and empirical data, economists generally focus on the average value of the stochastic distribution as the key summary statistic. For example, when testing theories about the relationship between an economic variable Y and another economic variable X, economists generally focus on how the *average* Y varies with X.<sup>27</sup> Indeed, the workhorse tool in empirical economics, ordinary least squares regression analysis, is built to estimate the average value of Y conditional on the value of a set of X variables.

49. Following this standard economic principle, it is appropriate to focus on the average RVC—in particular, the weighted mean RVC as discussed below—when constructing the initial RVC screen. Moreover, given the wide distributions of RVCs observed within a given commodity, statistical measures focused on something other than the center of the distribution—

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<sup>27</sup> See, e.g., Goldberger, Arthur Stanley, *A course in econometrics*. Harvard University Press, 1991, Chapter 1.

as the dashboard method proposes with its initial screen—would place too much weight on outliers and would not focus enough on the outcomes associated with a typical move. That is, they would focus on the edge cases, not the central tendency of the distribution, which better reflects how the commodity behaves in general.

(b) *Testing the hypothesis that mean RVC is at or below 180*

50. After determining the appropriate metric to analyze, the other critical step is to formulate a *testable* hypothesis that can be studied empirically.<sup>28</sup> For example, an economically meaningful hypothesis is to ask whether the mean RVC for the traffic in question is at or below 180, thus establishing a null hypothesis consistent with the jurisdictional threshold, with the alternative hypothesis being that the mean RVC is above 180. If the null hypothesis is not rejected, there would be no further statistical basis for additional inquiry. Only if one can reject the hypothesis that mean RVC is at or below 180—meaning that there is statistical evidence sufficient to conclude that average RVC for a given commodity *exceeds* 180—would there be a sound economic basis for proceeding with the investigation. The null hypothesis discussed here leads to a one-sided statistical test that rejects the null hypothesis if the test statistic (which is the standardized version of the mean RVC) is sufficiently large so as to rule out the conclusion that the estimated mean is consistent with the null hypothesis (RVC at or below 180).<sup>29</sup> This approach is also deeply grounded in the economic and legislative principle that competition should be relied upon wherever possible and regulation should be a last resort: Regulation should be considered only if the hypothesis that mean RVC is at or below 180 can be rejected.

51. The implementation of the test discussed here is complicated by the fact that the waybill sample is not reflective of the full population of railroad movements. This creates several issues to consider in designing the proper statistical test.

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<sup>28</sup> For detailed discussion of hypothesis testing, see, e.g., Wooldridge, Jeffrey M. *Introductory Econometrics: A Modern Approach*. Cengage Learning, 5<sup>th</sup> edition, 2013, Appendix C, Section C.6.

<sup>29</sup> In contrast with to a two-sided test, which rejects the null using the rule  $|t| > c$  (where  $t$  is the  $t$ -statistic and  $c$  is the critical value obtained from the  $t$ -distribution), the one-sided test's rejection rule is  $t > c$ , meaning that only positive deviations from the hypothesized mean lead to rejection. As such, for a one-sided test with a 5% significance level, the critical value is the 95<sup>th</sup> percentile of the  $t$ -distribution (1.65), not the 97.5<sup>th</sup> percentile (1.96) used in two-sided tests.

52. First, because the Waybill is a sample, it is appropriate to do hypothesis testing as described above, building the hypothesis test around a proper statistical measure of the amount of random variation (“noise”) in the data. That is, the mean estimated from the sample carries a degree of statistical uncertainty, which needs to be accounted for by estimating a standard error for the estimated mean that reflects the inherent imprecision of the estimates derived from any given sample. The standard error plays a crucial role in hypothesis testing since it serves as an input to the test statistic used to reject (or fail to reject) the null hypothesis. Effectively the standard error captures the amount of noise in the data, and only if the average RVC is far enough above 180 to be clearly outside the noise can the hypothesis be rejected.

53. Second, the Waybill is not a simple random sample; rather, it samples specific moves at different sampling rates. Specifically, the Waybill is a *stratified* sample, meaning that each observation represents a certain number of the waybills in the overall population and reflects a certain sampling rate associated with that type of movement. The sampling rates vary between 2.5 and 50 percent, depending on the number of carloads on the waybill.<sup>30</sup> As a result, to properly reflect the different sampling rates and the different quantities underlying each observation, one should estimate a weighted mean, in which the RVCs associated with each observation are weighted by the associated “expanded ton-miles,”<sup>31</sup> which reflect both the sample rate and the quantity on the sampled waybill.<sup>32</sup>

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<sup>30</sup> To achieve the differential sampling rate across different types of shipments, the sample is *stratified* meaning that there are multiple strata, each of which is defined based on the number of carloads on the waybill (e.g. stratum 1 consists of observations with 1-2 carloads on a waybill, stratum 2 consists of 3-15 carloads, etc.). Each stratum comes with a different sample rate: shipments consisting of one or two carloads are sampled at a low rate (1/40), whereas shipments with more carloads come with higher sampling rates (e.g. stratum 5 which consists of waybills with 101 or more carloads is sampled at a 1/2 rate). Beyond stratification, the Waybill sampling procedure involves systematic sampling where four subsamples are drawn from each stratum, following a systematic ordering that starts with a random observation and then drawing every 1/Kth observation thereafter where K reflects the sampling rate associated with each stratum.

<sup>31</sup> Expanded ton-miles are calculated by multiplying the waybill’s ton-miles by the theoretical expansion factor implied by the waybill’s stratum.

<sup>32</sup> When calculating the weighted mean RVC, one should avoid simply dividing the sum of expanded revenues by the sum of expanded variable cost, because such a calculation effectively computes a weighted mean, with weights given by the expanded variable cost. Weighting in this way is inappropriate because the weights would reflect not only the sampling rate but also the variable cost allocated to the waybill. Weighting by quantity provides a more appropriate metric.

54. Third, calculating the standard errors requires specific technical steps that reflect the nature of the sampling process and the noise it introduces. For example, when the sampling process involves stratification, one must make appropriate adjustments to the calculation of the standard errors to reflect the differential sampling rates across the strata. Moreover, the standard errors of estimated means must be calculated using the appropriate degrees of freedom, based on the number of observations in each stratum (which reflect the number of randomly drawn observations), not the number of “expanded ton-miles,” which would overstate the number of independent draws in the sample and therefore understate the estimated standard error.<sup>33</sup>

55. I have conducted such an illustrative hypothesis test focusing on the commodities subject to this proceeding using the 2018 CCWS data, presented in Table 1 below.<sup>34</sup>

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<sup>33</sup> When using the STATA statistical software, stratification can be accounted for using the “svy mean” command. Moreover, one may use the “svy mean” command with probability weights, which will use the appropriate degrees of freedom in the standard error calculation (e.g. “svyset \_n [pweight=expandedtonmiles], strata(stratumidentification); svy: mean RVC).

<sup>34</sup> For three of the commodities in Table 1 (“Motor Passenger Cars, Assembled (37111)”, “Hydraulic Cement (32411)” and “Iron or Steel Sheet or Strip (33123)”) computing a standard error adjusting for stratification is not feasible due to the presence of strata with single observations. For these three commodities, I compute the standard errors without a stratification adjustment, which generally has only a small effect on estimated standard errors.

**Table 1: Statistical Test Using Weighted Mean RVC**

| Commodity (STCC5)                                     | Proceeding Commodity | "Considered" Commodity | Mean RVC | Standard Error | Test (H0: RVC≤1.8) p-value | Test Result    |
|-------------------------------------------------------|----------------------|------------------------|----------|----------------|----------------------------|----------------|
| Agricultural Limestone, Broken or Crushed (14211)     | x                    |                        | 1.403    | 0.134          | 0.998                      | Fail to Reject |
| Fluxing Limestone or Stone, Broken or Crushed (14212) | x                    |                        | 3.564    | 0.087          | 0.000                      | Reject         |
| Dolomite, Broken or Crushed (14213)                   | x                    |                        | 1.497    | 0.020          | 1.000                      | Fail to Reject |
| Broken or Crushed Stone or Riprap, Nec (14219)        | x                    |                        | 1.861    | 0.014          | 0.000                      | Reject         |
| Coke Produced from Coal (29914)                       | x                    |                        | 1.838    | 0.039          | 0.168                      | Fail to Reject |
| Hydraulic Cement (32411)                              | x                    |                        | 1.769    | 0.011          | 0.997                      | Fail to Reject |
| Steel Ingot or Semifinished Shapes (33121)            | x                    |                        | 1.439    | 0.014          | 1.000                      | Fail to Reject |
| Iron or Steel Plates (33122)                          | x                    |                        | 1.612    | 0.017          | 1.000                      | Fail to Reject |
| Iron or Steel Sheet or Strip (33123)                  | x                    |                        | 1.425    | 0.006          | 1.000                      | Fail to Reject |
| Iron or Steel Bars, Bar Shapes or Rods (33124)        | x                    |                        | 1.681    | 0.019          | 1.000                      | Fail to Reject |
| Structural Shapes or Piling Products (33125)          | x                    |                        | 1.711    | 0.027          | 1.000                      | Fail to Reject |
| Iron or Steel Pipes, Tubes or Fittings (33126)        | x                    |                        | 1.888    | 0.020          | 0.000                      | Reject         |
| Tin Mill Products (33127)                             | x                    |                        | 1.867    | 0.084          | 0.212                      | Fail to Reject |
| Railway Track Material (33128)                        | x                    |                        | 2.056    | 0.085          | 0.001                      | Reject         |
| Primary Iron or Steel Products, Nec (33129)           | x                    |                        | 1.590    | 0.029          | 0.999                      | Fail to Reject |
| Iron or Steel Scrap (40211)                           | x                    |                        | 1.468    | 0.008          | 1.000                      | Fail to Reject |
| Pulpwood Logs (24114)                                 |                      | x                      | 1.266    | 0.042          | 1.000                      | Fail to Reject |
| Pulpwood or Other Wood Chips (24115)                  |                      | x                      | 1.255    | 0.020          | 1.000                      | Fail to Reject |
| Lumber, Rough or Dressed (24211)                      |                      | x                      | 1.351    | 0.005          | 1.000                      | Fail to Reject |
| Plywood or Veneer or Built-up Wood (24321)            |                      | x                      | 1.452    | 0.017          | 1.000                      | Fail to Reject |
| Strand Board Wood Product (24991)                     |                      | x                      | 1.451    | 0.010          | 1.000                      | Fail to Reject |
| Wood Particle Board (24996)                           |                      | x                      | 1.417    | 0.021          | 1.000                      | Fail to Reject |
| Special Industrial Paper (26217)                      |                      | x                      | 1.402    | 0.051          | 1.000                      | Fail to Reject |
| Fibreboard, Paperboard or Pulpboard (26311)           |                      | x                      | 1.433    | 0.006          | 1.000                      | Fail to Reject |
| Motor Passenger Cars, Assembled (37111)               |                      | x                      | 1.208    | 0.003          | 1.000                      | Fail to Reject |
| Motor Trucks or Truck Tractors, Assembled (37112)     |                      | x                      | 1.261    | 0.004          | 1.000                      | Fail to Reject |
| Motor Vehicle Frames, Assembled (37143)               |                      | x                      | 1.832    | 0.036          | 0.191                      | Fail to Reject |
| Paper Waste or Scrap (40241)                          |                      | x                      | 1.162    | 0.015          | 1.000                      | Fail to Reject |

56. I find that for twelve of the sixteen (5-digit STCC) commodities subject to this proceeding the statistical test fails to reject the hypothesis that the weighted mean RVC is at or below 180. The economic interpretation of this test is that for twelve of the sixteen commodities at issue in this proceeding, there is no statistical basis to conclude that the average RVC exceeds 180, and the jurisdictional threshold for rate regulation is therefore not met.

57. For illustrative purposes, I also conduct the same test across the Board's list of commodities considered for exemption revocation as presented in the Board's proposal (listed as "Considered Commodities" in Table 1).<sup>35</sup> I find that for *none* of the "considered commodities" the statistical test rejects the null hypothesis that the weighted mean RVC is at or below 180, meaning that *none* of them meet the jurisdictional threshold for rate regulation.

58. The results of these hypothesis tests should dictate the next steps in the Board's process. Where the statistical tests fail to reject the hypothesis that the mean RVC is over 180, the Board should conclude that traffic for this commodity is generally outside the Board's jurisdiction for

<sup>35</sup> 2020 Request for Comments, Appendix C, "Commodities to Consider for Exemption Revocation Using R/VC Ratios."

rate regulation and thus that rate regulation is not warranted. The Board should move forward with a comprehensive competitive analysis only if this statistical test *rejects* the null hypothesis that RVC for a given commodity are, on average, at or below 180 (as it does for only four of the sixteen commodities at issue in this proceeding). If the statistical test indicates that additional analysis is warranted, that analysis, which I describe below, must move beyond RVC and focus on intermodal competition (step 2) as outlined in Section IV.B. And only if the Board's analysis fails to find sufficient intermodal competition, would there be sufficient basis to proceed with the detailed analysis of intramodal, product and geographic competition described in sections IV.C (step 3) and IV.D (step 4), below.

## **B. INTERMODAL COMPETITION**

59. The RVC screen described above establishes whether a particular commodity under review generally falls within the Board's jurisdiction for rate regulation. If the RVC is high enough to move past step 1, then the next step (2) is to consider competition from other modes of transportation. An appropriate screen here can be built from rail's share of the overall market for transportation of a given commodity, using data on market shares by transportation mode. If rail's share is relatively low then—much like low market shares or market concentration measures are generally treated as safe harbors in merger analysis or analysis of alleged monopolization<sup>36</sup>—there is no basis to find a lack of adequate competition constraining rail rates, and the analysis should stop (unless shippers can present evidence that disproves the conclusion drawn from the data).

60. OE's proposed dashboard approach suggests several methods for identifying intermodal competition, none of which is based on modal market shares. The Board incorporates an initial intermodal screen in the Indicator Dashboard, assessing that there is a weak case for revocation if more than 40% of traffic moves in intermodal (i.e., TOFC/COFC) equipment. If this initial screen is not met, intermodal influences are incorporated in the indicators that make up the Indicator Dashboard. Waterborne alternatives are identified using a screen that identifies water alternatives with origins and destinations within 30-miles of the incumbent rail lane. Truck competition is identified using a 500-mile length of haul screen to identify incumbent rail moves

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<sup>36</sup> *Merger Guidelines* at §5.3.

that are short enough to be deemed truck-competitive. These indicators for water and truck competition – on specific routes and on average for a specific commodity – are then used in several indicators in the dashboard.

61. Before moving away from a market solution toward a regulatory solution, the hypothesis that rail faces competition from other modes of transportation must be rejected. Rejecting this hypothesis requires a thorough analysis of the degree to which a given commodity is subject to intermodal competition. This cannot be done using the information available in the Waybill sample alone, as by construction that sample does not include non-rail modes. More generally, basing analyses on the Waybill sample plus rough indicators of competition from other modes would be akin to performing merger analysis without share data on all relevant competitors, something that would not be acceptable.

62. A robust analysis of the extent to which rail movements face competition from other modes of transportation—including truck and barge—requires analyzing data on modal share. If such an analysis demonstrates significant competition from alternative modes, there is no basis to abandon the market and impose regulation. Only if the presence of such intermodal competition can be rejected should regulation (including via exemption revocation) even be considered.

63. OE’s proposed intermodal screen—that if at least 40% of rail traffic for a given commodity moves in intermodal equipment that is a “reasonable approximation of the point at which there is enough intermodal traffic” to indicate sufficient competition<sup>37</sup>— can be incorporated in this analysis. If the Board finds that at least 40% of rail traffic for a given commodity moves in intermodal equipment **or** that the modal share analysis described below identifies sufficient intermodal competition, the Board can conclude that competition is sufficient and the analysis can stop.

64. Based on the results reported by the Board in Appendix C of the 2020 Request for Comments, three commodities (special industrial paper, ready-mix cement, and primary iron or steel products) have sufficient levels of traffic moving in intermodal equipment to conclude

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<sup>37</sup> 2020 Request for Comments at 9-10 and fn 29.

competition is sufficient and the Board's analysis can stop.<sup>38</sup> For all other commodities, the analysis of modal shares should proceed as outlined below.

**1. The Freight Analysis Framework database should be used in the analysis of modal shares**

65. Data on modal shares is available in the Federal Highway Administration's Freight Analysis Framework ("FAF"). FAF is a nationwide database measuring freight movement by all modes of transportation. These data are based on the U.S. Census Bureau's Commodity Flow Survey and international trade data and incorporate additional data for specific sectors.<sup>39</sup> This database includes data on the commodity, mode of transportation (including rail, truck, and water), and the origin and destination geographies of freight movements. It provides a complete view of U.S. freight transportation across modes.

66. At the Technical Conference on January 15, OE noted that there are differences in aggregation between the FAF and the Waybill in terms of both geography and commodity classifications, indicating that the higher level of FAF aggregation reduces the precision of this data source. Although this may be true, these data still address the most relevant question—shares by mode—and one should not throw out data on the relevant question simply because these data are less precise than other data which fail to address the relevant question. That is one should not substitute a measure of statistical precision for a consideration of the relevance of the data. Instead, one can account for the lack of precision in the statistical analysis. I describe such an approach below and show that, even at the level of aggregation reported in the FAF, these data can provide valuable information about the degree to which a given commodity moves via alternative modes and the extent to which those alternatives discipline rail rates, with proper adjustments made to account for the level of aggregation of the data.

67. First, to demonstrate that modal shares available in the FAF data provide useful information regarding the degree of intermodal competition affecting a specific commodity, I implement a simple regression analysis of weighted mean rail rates on modal shares (at the 5-

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<sup>38</sup> 2020 Request for Comments at 65.

<sup>39</sup> See U.S. Department of Transportation, Federal Highway Administration "Freight Analysis Framework," ([https://ops.fhwa.dot.gov/freight/freight\\_analysis/faf/index.htm](https://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm)).

digit STCC level) and variable cost.<sup>40, 41</sup> Table 2 reports the results of this analysis. The results reveal a negative and statistically significant effect of higher truck and water shares on rail rates, meaning that an increase in the amount of truck and water competition for a given commodity, as measured by the FAF, is associated with a decrease in rail rates for that commodity.<sup>42</sup> For example, the coefficients reported in Table 2 show that a 10 percentage point increase in truck shares (labeled Truck FAF Share in Table 2) lowers rail rates by approximately 3 percent and a 10 percentage point increase in water shares (Water FAF Share) lowers rail rates by approximately 10 percent.<sup>43</sup>

**Table 2: Mean Rail Rates as a Function of FAF Modal Shares**

|                                    |                   |
|------------------------------------|-------------------|
| Log (variable cost/ton-mile)       | 0.77**<br>[0.12]  |
| Truck FAF Share                    | -0.32**<br>[0.15] |
| Water FAF Share                    | -1.11**<br>[0.45] |
| Other FAF Share                    | 0.04<br>[0.19]    |
| Constant                           | -0.51<br>[0.72]   |
| Observations                       | 454               |
| R-squared                          | 0.369             |
| Robust standard errors in brackets |                   |
| ** p<0.05, * p<0.1                 |                   |

68. These results demonstrate that modal shares are an important component in the analysis of intermodal competition and that the FAF data provide an informative source of data on modal

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<sup>40</sup> I calculated the weighted mean rail rates following the same method I describe above for the calculation of weighted mean RVCs (see Section IV.A.3). Specifically, I weight the rail rates by the waybill's "expanded ton-miles," which reflects the sample rate and quantity associated with each observation.

<sup>41</sup> This analysis required mapping the Standard Classification of Transportable Goods ("SCTG") codes reported in the FAF data to STCC codes reported in the Waybill because modal shares for each commodity can be calculated at the 2-digit SCTG product level. I performed this mapping based on information provided by NS.

<sup>42</sup> The regression excludes certain outliers defined as the top/bottom 1% of commodities in terms of calculated mean weighted rate per ton-mile. Without such as an outlier screen, the results lead to a similar conclusion with similar point estimates and statistical significance at the 5% for Water FAF shares and significance at the 10% level for Truck FAF shares.

<sup>43</sup> The truck and water variables are defined as 0 to 1 so the interpretation of the coefficients is that the parameter estimate divided by 100 gives the effect of a 1 percentage point change in shares.

shares to guide the analysis of intermodal competition. That said, I recognize that the higher level of aggregation in the FAF data implies that careful attention should be given to assuring that the commodity under review is sufficiently similar to the commodity grouping available in the FAF data, such that modal shares based on FAF data are useful in analyzing the commodity in question. One method to address this issue is to implement a test for outliers before proceeding to the modal share analysis—ensuring that the commodity in question is not an outlier relative to the overall FAF commodity group. Another is to ensure that shippers have the opportunity to refute a finding of modal competition based on analysis of FAF data with specific data that proves that the broader finding does not apply in the specific case. I discuss each of these methods below.

## 2. **Test for outliers**

69. Given the possibility that a particular commodity under review may be so different from other commodities in the broad FAF commodity group to which it belongs as to render the modal shares uninformative, it is reasonable to first consider a test to identify such outliers. Therefore, before calculating modal shares, the analysis of intermodal competition should begin with a test for whether the commodity in question is a clear outlier, sufficiently different from other commodities in the same FAF commodity group (SCTG2) such that the data on modal competition from the FAF will not be informative for the specific commodity. Commodities identified as outliers would skip past the analysis of intermodal shares and on to step 3, the analysis of competition on specific routes (outlined in Section IV.C), unless sufficient alternative evidence of intermodal competition is provided from another source by a participant in the proceedings. In contrast, for all commodities that are not found to be outliers, a modal share analysis based on FAF data would guide the Board's next steps.

70. To implement a test for outliers, I rely on the concept of calculating “fences,” a method for identifying outlier values in a distribution advocated by John Tukey in his book on *Exploratory Data Analysis*.<sup>44</sup> Tukey suggests using a measure of spread (such as the interquartile range, IQR, which measures the spread between the first and third quartile of a

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<sup>44</sup> *Tukey at 44-45.*

distribution), multiplied by a “step” factor (Tukey suggests 1.5) to establish “fences,” with values lying outside these fences treated as outliers.<sup>45</sup>

71. Applying the fence concept here, commodities could be evaluated based on prices in the waybill data, to determine if the commodity is an outlier relative to other commodities mapped to the two-digit SCTG grouping in the FAF data. This requires mapping SCTG codes to STCC codes, which has been done by private firms such as IHS Markit in its Transearch database. Some railroads rely on such mappings in the normal course of business, and these mappings could be requested by the Board. Using the mapping of SCTG codes to STCC codes, the following steps would be employed:

- Map the 4-digit STCC code from the CCWS to the predominant SCTG code and identify all of the 5-digit STCCs that predominantly map to that SCTG code;
- Generate a price distribution (based on revenue per ton mile) of all 5-digit STCCs that map to the relevant SCTG code;
- Calculate the IQR of the price distribution (i.e., calculate the difference between the first and third quartiles of the price distribution);
- Using the calculated IQR and Tukey’s suggested 1.5 “step,” calculate relevant “fences”; and
- Evaluate the subject commodity’s price relative to the fence to determine if it is outside the fence and thus is an outlier.

72. If a subject commodity falls above the fence – that is, its average price is above the 3<sup>rd</sup> quartile by more than 1.5 times the IQR– that commodity would be considered an outlier that may not be subject to the same modal competition identified by the FAF data. In these cases, unless the parties offer alternative, specific, reliable data on modal shares, the Board should skip the analysis of FAF modal shares and move directly to an analysis of competition on specific routes as outlined in Section IV.C. If the commodity under review is not an outlier, then the Board should proceed to an analysis of modal shares based on FAF data.

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<sup>45</sup> Tukey at 44-45.

73. Table 3 shows the results of this outlier test for the 16 commodities at issue in this proceeding and the commodities the Board said it is considering evaluating. Although only four of the sixteen commodities move beyond the initial RVC screen, I include all of the commodities at issue in this proceeding in this table for illustrative purposes.

**Table 3: Test for Outliers Using Interquartile Range and Tukey Fences**

| Commodity (STCC5)                                     | Proceeding Commodity | "Considered" Commodity | Revenue Per Ton Mile | Predominant STCG Category | Lower Fence | Upper Fence | Outlier |
|-------------------------------------------------------|----------------------|------------------------|----------------------|---------------------------|-------------|-------------|---------|
| Agricultural Limestone, Broken or Crushed (14211)     | x                    |                        | \$0.088              | 12 Gravel                 | -\$0.037    | \$0.163     | FALSE   |
| Fluxing Limestone or Stone, Broken or Crushed (14212) | x                    |                        | \$0.232              | 12 Gravel                 | -\$0.037    | \$0.163     | TRUE    |
| Dolomite, Broken or Crushed (14213)                   | x                    |                        | \$0.083              | 12 Gravel                 | -\$0.037    | \$0.163     | FALSE   |
| Broken or Crushed Stone or Riprap, Nec (14219)        | x                    |                        | \$0.044              | 12 Gravel                 | -\$0.037    | \$0.163     | FALSE   |
| Coke Produced from Coal (29914)                       | x                    |                        | \$0.069              | 19 Coal-n.e.c.            | \$0.031     | \$0.085     | FALSE   |
| Hydraulic Cement (32411)                              | x                    |                        | \$0.056              | 31 Nonmetal min. prods.   | \$0.039     | \$0.069     | FALSE   |
| Steel Ingot or Semifinished Shapes (33121)            | x                    |                        | \$0.052              | 32 Base metals            | \$0.032     | \$0.086     | FALSE   |
| Iron or Steel Plates (33122)                          | x                    |                        | \$0.061              | 32 Base metals            | \$0.032     | \$0.086     | FALSE   |
| Iron or Steel Sheet or Strip (33123)                  | x                    |                        | \$0.062              | 32 Base metals            | \$0.032     | \$0.086     | FALSE   |
| Iron or Steel Bars, Bar Shapes or Rods (33124)        | x                    |                        | \$0.056              | 32 Base metals            | \$0.032     | \$0.086     | FALSE   |
| Structural Shapes or Piling Products (33125)          | x                    |                        | \$0.058              | 32 Base metals            | \$0.032     | \$0.086     | FALSE   |
| Iron or Steel Pipes, Tubes or Fittings (33126)        | x                    |                        | \$0.061              | 32 Base metals            | \$0.032     | \$0.086     | FALSE   |
| Tin Mill Products (33127)                             | x                    |                        | \$0.069              | 32 Base metals            | \$0.032     | \$0.086     | FALSE   |
| Railway Track Material (33128)                        | x                    |                        | \$0.084              | 32 Base metals            | \$0.032     | \$0.086     | FALSE   |
| Primary Iron or Steel Products, Nec (33129)           | x                    |                        | \$0.067              | 32 Base metals            | \$0.032     | \$0.086     | FALSE   |
| Iron or Steel Scrap (40211)                           | x                    |                        | \$0.053              | 41 Waste/scrap            | \$0.012     | \$0.104     | FALSE   |
| Pulpwood Logs (24114)                                 |                      | x                      | \$0.079              | 25 Logs                   | \$0.021     | \$0.114     | FALSE   |
| Pulpwood or Other Wood Chips (24115)                  |                      | x                      | \$0.066              | 25 Logs                   | \$0.021     | \$0.114     | FALSE   |
| Lumber, Rough or Dressed (24211)                      |                      | x                      | \$0.044              | 26 Wood prods.            | \$0.024     | \$0.075     | FALSE   |
| Plywood or Veneer or Built-up Wood (24321)            |                      | x                      | \$0.046              | 26 Wood prods.            | \$0.024     | \$0.075     | FALSE   |
| Strand Board Wood Product (24991)                     |                      | x                      | \$0.047              | 26 Wood prods.            | \$0.024     | \$0.075     | FALSE   |
| Wood Particle Board (24996)                           |                      | x                      | \$0.049              | 26 Wood prods.            | \$0.024     | \$0.075     | FALSE   |
| Special Industrial Paper (26217)                      |                      | x                      | \$0.053              | 27 Newsprint/paper        | \$0.024     | \$0.084     | FALSE   |
| Fibreboard, Paperboard or Pulpboard (26311)           |                      | x                      | \$0.061              | 27 Newsprint/paper        | \$0.024     | \$0.084     | FALSE   |
| Motor Passenger Cars, Assembled (37111)               |                      | x                      | \$0.128              | 36 Motorized vehicles     | -\$0.041    | \$0.253     | FALSE   |
| Motor Trucks or Truck Tractors, Assembled (37112)     |                      | x                      | \$0.157              | 36 Motorized vehicles     | -\$0.041    | \$0.253     | FALSE   |
| Motor Vehicle Frames, Assembled (37143)               |                      | x                      | \$0.170              | 36 Motorized vehicles     | -\$0.041    | \$0.253     | FALSE   |
| Paper Waste or Scrap (40241)                          |                      | x                      | \$0.055              | 41 Waste/scrap            | \$0.012     | \$0.104     | FALSE   |

74. The table shows that only one commodity – fluxing limestone – is identified as an outlier.<sup>46</sup> In this case, fluxing limestone would move to the next step in the analysis (consideration of competition on specific rail rates) and the remaining commodities would move to an analysis of modal shares based on FAF data.

### 3. Modal share analysis

75. The best method for assessing the degree to which a commodity faces intermodal competition is to evaluate modal shares. For any commodity that has passed the RVC screen and that has not been flagged as an outlier, commodity-level modal shares should be calculated using

<sup>46</sup> The movements of fluxing limestone in the 2018 Waybill move less than 50 miles by rail which explains the high price for this commodity. I return to a consideration of specific aspects of the rail moves for this commodity in step 3, below.

the FAF data. The FAF data includes ton-miles by different modes of transportation (e.g., rail, truck, water). Modal shares can be calculated for each SCTG commodity grouping and these modal shares can be assigned to each STCC, using the same mapping that was used in the test for outliers.

76. To implement this test, I propose assigning commodities to one of three categories based on their non-rail modal shares—high, intermediate, and low—which should guide the Board’s next steps. This requires identifying thresholds for the high, intermediate, and low categories. The intermodal indicator used in the dashboard method provides guidance on point.

77. As noted above, in the 2020 Request for Comments and at the Technical Conference on January 15, 2021, OE endorsed the assumption that if at least 40% of a commodity’s traffic has alternative modal options shippers of that commodity “can readily avail themselves of other transportation alternatives.”<sup>47</sup> Applying that metric here suggests that commodities with non-rail modal shares of at least 40% face sufficient competition from alternative transportation modes such that shippers can “reasonably avail themselves” of other alternatives. Recognizing there is some uncertainty around that number, it is reasonable to establish the following criteria: commodities with non-rail modal share above 50% are categorized as **high**; commodities with non-rail modal share below 30% are categorized as **low**; commodities with non-rail modal share between 30% and 50% are categorized as **intermediate**.

78. If non-rail modal shares for a given commodity are high—i.e., above 50%—there is evidence of sufficient modal competition, the Board cannot reject the hypothesis that there is competition from other modes of transportation, and the Board can stop its analysis. However, if shippers believe that the FAF data indicator is incorrect for a specific commodity, they should have the opportunity to present commodity-specific data and evidence to prove the specific commodity under review is not subject to competition from alternative modes. If reliable, detailed, commodity-specific evidence shows that the commodity under review is not subject to intermodal competition, the analysis then moves to the next step, an investigation of competition on specific routes. Otherwise, for any commodity in this high modal share category, analysis can

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<sup>47</sup> 2020 Request for Comments at fn 29.

stop, as competition from other modes has been found to be sufficient to eliminate the need for regulation.

79. Conversely, if the modal share analysis shows low modal shares, modal shares alone do not provide enough evidence of competition and the Board should proceed to the next set of analyses that consider route-level competition. Again, however, participants in the proceeding should have an opportunity to rebut such a finding with sufficient direct evidence of modal competition for the commodity in question.

80. Finally, if the modal share analysis shows intermediate modal shares then additional analysis is required before the Board can determine whether there is sufficient evidence of intermodal competition or whether further investigation is warranted. In these cases, it is informative to again consider the price (i.e., revenue per ton mile) for the specific commodity under review relative to prices for all commodities in the 2-digit SCTG category. Analyzing where the price of the commodity under review falls with respect to prices for all commodities in the group allows one to draw conclusions about how competition shown by modal shares affects the commodity under review: lower prices imply commodities that are more affected by modal competition, higher prices imply commodities that are less affected by modal competition.<sup>48</sup>

81. I propose the following approach:

- If a commodity is in the intermediate modal share range but in the bottom 2/3 of the 2-digit SCTG price distribution, there is enough evidence to conclude that the commodity does face sufficient intermodal competition (as reflected in modal shares) and the Board can stop its analysis.
- If, however, modal shares are in the intermediate range and the commodity falls in the top 1/3 of the 2-digit SCTG price distribution, these higher prices indicate there is not enough evidence to conclude that there is strong modal competition and the analysis should continue to the next step.

82. After incorporating the additional price-distribution analysis for commodities with modal shares in the intermediate range, results of the modal share analysis should guide the Board as

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<sup>48</sup> It is possible that lower prices may be driven by competition in addition to modal competition, but even if so, this would be consistent with a decision to stop the analysis here.

follows: For commodities with high non-rail modal share (i.e., above 50%) and commodities with intermediate non-rail modal shares (i.e., 30-50%) and that are also in the lower 2/3 of the price distribution of their commodity group, there is evidence of sufficient modal competition and the Board can stop its analysis. The Board should continue to the next step—analyzing competition on specific routes (step 3)—only for commodities with low non-rail modal shares (i.e., below 30%) or commodities with intermediate non-rail modal shares (i.e., 30-50%) and that are also in the top 1/3 of the price distribution of their commodity group.

83. Table 4 reports the results of this modal share analysis for the commodities under review in this proceeding. Although only three commodities have moved beyond both the RVC and outlier tests, I present the modal share analysis for all of the commodities at issue in this proceeding (including the commodities the Board said it is considering evaluating) for illustrative purposes.

**Table 4: Modal Share Analysis**

| Commodity (STCC5)                                     | Proceeding Commodity | "Considered" Commodity | Non-Rail Share | Category | Price Band | Result |
|-------------------------------------------------------|----------------------|------------------------|----------------|----------|------------|--------|
| Agricultural Limestone, Broken or Crushed (14211)     | x                    |                        | 81%            | High     | NA         | Stop   |
| Fluxing Limestone or Stone, Broken or Crushed (14212) | x                    |                        |                | OUTLIER  |            |        |
| Dolomite, Broken or Crushed (14213)                   | x                    |                        | 81%            |          | NA         | Stop   |
| Broken or Crushed Stone or Riprap, Nec (14219)        | x                    |                        | 81%            |          | NA         | Stop   |
| Coke Produced from Coal (29914)                       | x                    |                        | 93%            |          | NA         | Stop   |
| Hydraulic Cement (32411)                              | x                    |                        | 86%            |          | NA         | Stop   |
| Steel Ingot or Semifinished Shapes (33121)            | x                    |                        | 85%            |          | NA         | Stop   |
| Iron or Steel Plates (33122)                          | x                    |                        | 85%            |          | NA         | Stop   |
| Iron or Steel Sheet or Strip (33123)                  | x                    |                        | 85%            |          | NA         | Stop   |
| Iron or Steel Bars, Bar Shapes or Rods (33124)        | x                    |                        | 85%            |          | NA         | Stop   |
| Structural Shapes or Piling Products (33125)          | x                    |                        | 85%            |          | NA         | Stop   |
| Iron or Steel Pipes, Tubes or Fittings (33126)        | x                    |                        | 85%            |          | NA         | Stop   |
| Tin Mill Products (33127)                             | x                    |                        | 85%            |          | NA         | Stop   |
| Railway Track Material (33128)                        | x                    |                        | 85%            |          | NA         | Stop   |
| Primary Iron or Steel Products, Nec (33129)           | x                    |                        | 85%            |          | NA         | Stop   |
| Iron or Steel Scrap (40211)                           | x                    |                        | 82%            |          | NA         | Stop   |
| Pulpwood Logs (24114)                                 |                      | x                      | 88%            | High     | NA         | Stop   |
| Pulpwood or Other Wood Chips (24115)                  |                      | x                      | 88%            | High     | NA         | Stop   |
| Lumber, Rough or Dressed (24211)                      |                      | x                      | 86%            | High     | NA         | Stop   |
| Plywood or Veneer or Built-up Wood (24321)            |                      | x                      | 75%            | High     | NA         | Stop   |
| Strand Board Wood Product (24991)                     |                      | x                      | 75%            | High     | NA         | Stop   |
| Wood Particle Board (24996)                           |                      | x                      | 75%            | High     | NA         | Stop   |
| Special Industrial Paper (26217)                      |                      | x                      | 73%            | High     | NA         | Stop   |
| Fibreboard, Paperboard or Pulpboard (26311)           |                      | x                      | 70%            | High     | NA         | Stop   |
| Motor Passenger Cars, Assembled (37111)               |                      | x                      | 84%            | High     | NA         | Stop   |
| Motor Trucks or Truck Tractors, Assembled (37112)     |                      | x                      | 84%            | High     | NA         | Stop   |
| Motor Vehicle Frames, Assembled (37143)               |                      | x                      | 89%            | High     | NA         | Stop   |
| Paper Waste or Scrap (40241)                          |                      | x                      | 82%            | High     | NA         | Stop   |

84. Table 4 shows that non-rail modal shares for every commodity are high. These data demonstrate the presence of intermodal competition and the Board could stop its analysis (if the

commodity had made it to this point). Only fluxing limestone—identified as an outlier based on price—would move to analysis of route-specific competition.

85. In sum, while the data on modal shares are not perfect, modal shares are critical to assessing the degree to which railroads face intermodal competition and therefore are critical to the Board’s determination of whether competition is sufficient or whether regulatory intervention may be required. The lack of perfect data on modal shares does not mean the analysis should ignore the data that is available. That said, if despite the analysis presented above, the Board is not persuaded to use modal share data from the FAF, the Board still must grapple with how to incorporate modal shares into the analysis of intermodal competition. Any effort to improve data on modal shares is welcome, including perhaps by setting up voluntary data collection from shippers, who can report data on the extent to which they use different modes. While participation would be voluntary, to the extent this voluntary data reporting does not provide more complete information than the FAF data, the analysis could continue to use the FAF data.

### C. COMPETITION ON SPECIFIC RAIL ROUTES

86. If the Board is able to reject the tests that RVCs are below 180 and that intermodal competition is sufficient to constrain rail rates, the next step in a competitive analysis is to engage in a deeper dive into the extent of competition facing particular commodities on specific routes, building on the dashboard method’s geographic model, GMIM.

87. This analysis must assess both competition from direct rail alternatives and the *potential* for competition from other modes, as distinct from the analysis of intermodal competition in the prior step that focuses on evidence of *current* competition from alternative modes. Even if shares of other modes are low today, the possibility for expansion in those options cannot be ignored, just as entry and expansion should always be part of a competitive analysis.<sup>49</sup> Therefore, this analysis considers additional metrics to assess whether truck or water alternatives could reasonably expand to compete with rail on a given route, as well as direct competition from other railroads.

88. In conducting the analysis, it is important to consider competition broadly enough to capture all relevant competitive alternatives. In contrast to this broad consideration of

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<sup>49</sup> See, e.g., *Merger Guidelines* at § 9.

competitive alternatives, the GMIM is designed to evaluate competitive alternatives on a relatively narrow, lane-specific basis. While assessing lane-specific alternatives is important, there are other sources of competition that should be included in a complete competitive assessment that are not captured by the GMIM. As described below, the Board should consider several adjustments to GMIM that will improve its ability to identify all alternatives that provide economically meaningful competition for a specific rail route. The Board should also consider refining the somewhat ad hoc screens and threshold used in the proposed dashboard, including by implementing econometric analyses to determine appropriate levels for the screens and thresholds based on data. For example, the data used by OE to determine proximity of ports and rail stations could be used in combination with the Waybill data to perform statistical analyses testing the appropriateness of thresholds like the 30-mile proximity screen. In the following subsections, I outline some ways in which the GMIM analysis can be expanded to capture competition more accurately and completely and point out areas where econometric analysis could be used to test and refine the specific thresholds and metrics used at each step.

89. Under the current proposal, the results of the GMIM analysis are used as inputs to some of the indicators OE proposes. As noted above, the “overall dashboard signal” that is derived from these indicators is just an *ad hoc* score, which is not grounded in economic theory or the logic of relying on competition and avoiding regulation wherever possible and thus does not provide clear guidance on the proper decision. The GMIM analysis I outline below provides the Board with specific and detailed assessments of competitive alternatives and metrics that provide clear guidance for evaluating whether a specific commodity faces sufficient competition.

#### **1. Modifications to the GMIM**

90. The Board’s proposed method for evaluating competition on specific routes defines a competitive rail alternative as a lane that (a) originates and terminates within 30 miles of an existing rail lane; (b) moves “similar” commodities at the 5-digit STCC level; and (c) is served by a different railroad than an incumbent lane. The dashboard method also considers a specific route subject to truck competition if the rail length-of-haul is less than 500 miles and subject to waterborne competition if there are ports within 30 miles of both the origin and destination and those ports are on the same water system.

91. Generally, these criteria define competitive alternatives too narrowly and should be reconsidered to ensure that all relevant alternatives are considered. These modifications are initial suggestions, and there may be additional changes that are appropriate. The key is careful consideration of all metrics to make sure they are proper economic measures of competition.

*(a) Rail Alternatives*

92. Assessing the degree to which a particular rail route is subject to competition should begin with an analysis of all relevant rail alternatives. This includes the lane-specific alternatives addressed by the GMIM, but it also includes additional sources of rail competition that do not mirror existing lanes at both the origin and the destination. To capture all relevant alternatives, the Board should consider modifications to the proposed analysis, as described below.

93. First, the Board should expand the number of Waybill years used to identify competitive alternatives on specific O/D pairs. Using 3-5 years of Waybills increases the sample size and accounts for fact that some viable rail alternatives could be excluded from a single year because the Waybill samples different routes each year. Further, expanding the amount of data that is used improves the precision of the analysis (meaning it produces results with lower standard errors).

94. Second, the Board should relax the constraint that an alternative lane must have moved a “similar” commodity at the 5-digit STCC level. At minimum, a lane carrying the same 2-digit commodity should be considered a competitive alternative. More generally, a lane that carries any carload traffic (even if it does not carry a similar commodity at the 2-digit STCC level) but otherwise meets the Board’s criteria—i.e., an alternative railroad is available within 30 miles of an existing origin and destination—should be considered an alternative, unless a shipper can demonstrate that there are commodity-specific reasons that the lane cannot handle the commodity under review.

95. Third, the Board should not limit competitive rail alternatives to only those that mirror an incumbent line at both the origin and destination. Such an approach implicitly assumes, without justification, that both origin and destination must be matched for an alternative shipment to be competitive, something that is generally not the case. Rather, the analysis should consider whether competition at the origin or destination (or both) is the relevant factor and then apply the GMIM screens to either the origin or destination to look for alternatives that may be available to

shippers, even if those alternatives do not mirror an existing lane. This is important because if there are multiple sources for a commodity, as is the case for many commodities likely to be the subject of exemption analysis, the constraint that competition must come from a proximate origin could exclude important competitive alternatives and understate the degree of competition relevant to a specific rail lane.

96. For example, if a shipper is able to receive a commodity from either its existing rail origin or from an alternative origin (served by an alternative railroad) that is 100 miles from the existing origin, the current proposal would not recognize the alternative origin as a competitive influence on the existing rail lane. The GMIM could be adjusted to look for instances of this type of competition by applying the proximity screen to the origination and destination stations independently rather than to specific rail lanes. This adjustment will reveal competition when a commodity can be sourced from multiple origins such that the origin is not a competitive bottleneck. Conversely, in the scenario that there is a single origin but many locations where a specific shipper could ship to, the relevant side for competition purposes is the origin and proximity screens should be applied only to the origin.

97. After making these modifications, any route that has either a lane-specific rail alternative or another viable rail alternative should be identified as having a competitive influence and the proportion of traffic with such influences should be determined. If this analysis shows that at least 40% of traffic for a given commodity has alternative rail options, the Board can conclude that competition is sufficient and the analysis should stop. If this analysis shows that less than 40% of traffic for a given commodity has alternative rail options, the analysis should proceed to assessing potential competition from trucks. I propose a 40% threshold here based on the threshold OE identified as being indicative of shippers having alternative options available but the threshold can be further investigated using econometric assessments of the waybill data and other relevant data sources.

98. I have conducted this analysis for fluxing limestone to illustrate the method. Using the Board's workpapers, I identified all lanes moving fluxing limestone in the 2018 Waybill. There were

**REDACTED**

and whether that railroad moved a similar commodity (at either the 2- or 5-digit STCC level).

REDACTED

| Location | Road | Location w/in 30 Miles | Road | Distance | STCC2 O/T | STCC5 O/T |
|----------|------|------------------------|------|----------|-----------|-----------|
|----------|------|------------------------|------|----------|-----------|-----------|

REDACTED

99. As shown in the table,

REDACTED

route was

not identified by the Board because it did not handle a similar commodity at the 5-digit level at both a competing origin and a competing destination station. However, given the proximity of **RE** competing stations, its demonstrated ability to handle similar types of traffic, and its competing stations in close proximity to the destinations, it is very likely **RE** could handle this traffic and this lane should be included in the analysis as a competitive influence. Each lane would be credited with a competing influence, and given these two lanes are the only lanes moving this commodity in the 2018 Waybill, 100% of the rail traffic for fluxing limestone would have potential rail competition. This is well above the proposed 40% threshold, meaning that the Board can conclude there is sufficient competition and can stop its analysis.<sup>50</sup>

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<sup>50</sup> I also used the 2016 and 2017 Waybill data to determine whether any alternative lanes were present in those years. There were no additional lanes identified in 2017 and minimal volume identified in 2016.

*(b) Potential Truck Competition*

100. If the analysis of alternative rail options does not find that competition is sufficient, the Board should consider whether the route is subject to potential competition from trucks. The dashboard method proposes assessing the potential for truck competition based on the length of haul of current moves: Moves are considered subject to truck competition if they are shorter than 500 miles.

101. As with the dashboard approach to identifying rail alternatives, this approach also assumes that both the origin and the destination of a rail move are limiting factors and excludes truck competition from alternative sources of a commodity within 500 miles of a destination or alternative destinations for a commodity within 500 miles of an origin. To account for the possibility of truck-competitive alternatives at the origin or destination of a move, the analysis of potential truck competition should first determine whether it is competition at the origin or destination that is necessary for shippers and then the GMIM should be expanded to apply the 500 mile truck screen to only destination stations (looking for alternative origins within 500 miles, regardless of rail length-of-haul) or origin stations (looking for alternative destinations within 500 miles), as appropriate.

102. If an existing lane is either shorter than 500 miles or is subject to significant competition from trucks because alternatives exist within a 500-mile truck-competitive distance, that lane should be identified as having a competitive influence and the proportion of traffic subject to such influences should be calculated. If this analysis shows that at least 40% of the rail traffic of a given commodity has potential truck competition, the Board can conclude that competition is sufficient, and the analysis stops. If this analysis shows that less than 40% of the rail traffic of a given commodity has potential truck competition, the analysis should proceed to assessing potential competition from water alternatives. Again, I propose a 40% threshold here based on OE's proposed threshold, but the threshold should be investigated and, if appropriate, modified based on econometric analysis.

*(c) Potential Water Alternatives*

103. If neither the analysis of rail alternatives nor the analysis of potential truck competition shows sufficient competition, then the Board should consider whether the route is subject to potential competition from waterborne alternatives. The GMIM identifies routes as subject to

waterborne competitive influences if there are ports within 30 miles of both the origin and destination and those ports are on the same water system. Again, this limits the types of water alternatives that are identified by GMIM and excludes instances where a shipper may be able to receive a commodity at a port within 30 miles of an existing rail receiving point or ship a commodity from a port within 30 miles of its existing rail origin, regardless of the location at the other end of the water move. Similar adjustments to the application of the 30-mile proximity screen can be made to the GMIM to capture these types of water alternatives, after first determining whether competition at the origin or destination is relevant for shippers. The GMIM should also allow for moves that use interconnected waterways, rather than limiting alternatives to only ports on the same waterway.

104. Any route that has either a lane-specific water alternative or a viable water alternative based on analysis of the options available at the destination (when a commodity can be sourced from multiple locations) or the origin (if buyers can ship to multiple destinations) should be identified as having a competitive water influence. If this analysis shows that at least 40% of the rail traffic of a given commodity has water options, the Board can conclude that competition is sufficient, and the analysis stops. If this analysis shows that less than 40% of the rail traffic of a given commodity has water options, the analysis should proceed to assessing all potential competitive options. The level of this threshold should also be established based on empirical analysis.

*(d) Assessing all potential competition*

105. If the analysis of individual sources of competition (rail, potential truck, or potential water) does not identify a single source that offers sufficient competition, the final step in this analysis is to consider all sources collectively.

106. It is important to recognize that there would be overlaps when conducting such an aggregate screen. For example, if a given commodity is found to have 10% rail competition, 10% truck and 20% water competition, that does not mean that 40% of the traffic has competitive influences because some shipments may have more than one source of competition. To deal with this it is necessary to calculate the proportion of traffic that has influences from any of the three sources analyzed. If this calculation shows that at least 40% of the traffic has competitive alternatives, the Board can conclude that competition is sufficient, and the analysis can stop. The

analysis should move to the next step (an assessment of product and geographic alternatives) only if less than 40% of traffic has an alternative source of competition.

107. In sum, the analysis of competition on specific routes requires consideration of rail alternatives, potential truck alternatives, and potential water alternatives. If the analysis of rail alternatives (as modified above) for a given commodity shows that at least 40% of traffic has a rail alternative, the Board can conclude there is evidence that competition is sufficient and the analysis can stop. If the proportion of rail traffic with a rail alternative is below 40%, the Board must consider whether a specific route is subject to potential competition from trucks.

108. If the analysis of potential truck alternatives (as modified above) for a given commodity shows that at least 40% of traffic has a potential truck alternative, the Board can conclude there is evidence that competition is sufficient, and the analysis can stop. If, however, the proportion of rail traffic with a potential truck alternative is below 40%, the Board must consider whether a specific route is subject to potential competition from waterborne alternatives. If the analysis of potential waterborne alternatives (as modified above) for a given commodity shows that at least 40% of traffic has a potential water alternative, the Board can conclude there is evidence that competition is sufficient, and the analysis can stop.

109. If, however, the analysis of individual sources of competition (rail, potential truck, or potential water) does not identify a single source that offers sufficient competition, all sources must be considered collectively. If at least 40% of the traffic has competitive alternatives, the Board can conclude that competition is sufficient, and the analysis can stop. Analysis continues to the next step—consideration of product and geographic competition—only if the analysis has shown that less than 40% of traffic for a given commodity has competitive alternatives.

#### **D. GEOGRAPHIC AND PRODUCT COMPETITION**

110. The analysis thus far has established a screen for jurisdiction for the purposes of rate regulation based on RVC, then a screen for intermodal competition, then a screen for competition on specific routes, including both intramodal and potential intermodal competition. If those three screens all reject a finding of sufficient competition, then the final step is to consider two remaining sources of competition – geographic and product competition. As discussed below, such analysis should look beyond the Waybill sample, as by its nature, that sample is focused on information about railroad markets, while geographic and product

competition are questions about the downstream markets in which shippers operate, and thus about which shippers should be required to provide additional useful information if they seek to have the last resort option of rate regulation applied.

111. It is a well-established principle in antitrust economics that competition from alternative geographies or from substitute products are important sources of competition and that a proper assessment of competition in a market must consider these alternatives.<sup>51</sup> For example, the Horizontal Merger Guidelines state:

Market definition focuses solely on demand substitution factors, i.e., on customers' ability and willingness to substitute away from one product to another in response to a price increase or a corresponding non-price change such as a reduction in product quality or service.... Customers often confront a range of possible substitutes for the products of the merging firms. Some substitutes may be closer, and others more distant, either geographically or in terms of product attributes and perceptions.<sup>52</sup>

112. Geographic competition provides direct competition in the form of alternative routings that allow shippers to take advantage of the ability to send products to (or receive products from) alternative locations that offer service from different railroads. A commodity that appears to have little competition from alternative transportation modes may be geographically dispersed such that multiple railroads can supply the product from various locations.

113. Product competition exists if shippers are able to substitute away from a product shipped by rail to an alternative product with alternative transportation options. A commodity with limited modal competition and limited geographic competition may face significant competition from a substitute product. For example, a shipper may be able shift to an alternative product (supplied by an alternative railroad or alternative mode) if rail rates are too high. Or, a shipper may face competition from alternative products and could lose sales to lower-priced alternatives if rail rates are too high. As a matter of economics, both of these possibilities represent lost sales to the railroad and thus both are a source of elasticity that constrains prices. Assessing such competitive alternatives is an essential part of a thorough competitive analysis.

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<sup>51</sup> See, e.g., *Merger Guidelines* at § 4.

<sup>52</sup> *Merger Guidelines* at § 4.

114. The fact that product and geographic alternatives are important sources of competition in the rail industry has been recognized in prior exemption decisions.<sup>53</sup> Indeed, product and geographic competition were cited as important factors in granting exemptions for several of the commodities in this proceeding, including coke from coal,<sup>54</sup> iron or steel scrap,<sup>55</sup> and hydraulic cement.<sup>56</sup> Further, based on the analysis I did in 2016, there is evidence that product and/or geographic alternatives are an important source of competition for crushed stone, primary iron or steel, steel scrap and waste, coke from coal, and hydraulic cement.<sup>57</sup>

115. Before the Board takes the extreme step of resorting to regulation, it must have definitive evidence to reject competition from product and geographic alternatives. However, a full evaluation of geographic and product competition will demand the agency look beyond the FAF and Waybill Sample. This is particularly true with respect to identifying relevant substitute products, for which shippers are certainly the best source of information about competition for their products, but it also applies to a complete understanding of the geographic markets in which those products compete. Therefore, before concluding that competition is insufficient to discipline rates, the Board should require shippers to submit the data and information necessary to analyze product and geographic alternatives.

116. Analysis of geographic and product markets is standard at DOJ and FTC and the types of evidence they consider, as well as their processes for requesting and analyzing evidence on these topics, can offer guidance to the Board, including about the information to request from shippers.

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<sup>53</sup> See, e.g., Petition to Exempt from Regulation the Rail Transportation of Scrap Paper, Ex Parte No. 394 (Sub-No. 12) 9 I.C.C. 2d 957 (September 17, 1993) at 3; Rail General Exemption Authority – Petition Of AAR to Exempt Rail Transportation Of Selected Commodity Groups, 9 I.C.C.2d 969 (September 17, 1993) at 5 (with respect to STCCs 20-131 (Lard), 20-139 (Meat Products), and 24-1 (Primary forest or wood raw materials)) and 6-7 (with respect to STCC 32-952-15 (Cinders, clay shale, slate)).

<sup>54</sup> See Rail General Exemption Authority – Petition Of AAR to Exempt Rail Transportation Of Selected Commodity Groups, 9 I.C.C.2d 969 (September 17, 1993), at 6.

<sup>55</sup> Surface Transportation Board, Docket No. EP 704 (Sub-No. 1) Review of Commodity, Boxcar, and TOFC/COFC Exemptions, Decision, March 23, 2016 at 6.

<sup>56</sup> Rail General Exemption Authority – Exemption of Hydraulic Cement, EP 346 (Sub-No. 34) 10 ICC 2d 649 (July 26, 1995) at 3-4.

<sup>57</sup> Docket No. Ep 704 (Sub-No. 1), Verified Statement of Mark Israel and Jonathan Orszag, July 26, 2016 at 20-21 and 25-28.

As noted in the Merger Guidelines, DOJ and FTC consider a wide array of “reasonably available and reliable evidence,” including information on customer response to changes in price; information on product characteristics and the costs of switching products; and the influence of downstream competition faced by customers in their markets.<sup>58</sup>

117. This type of information is found in many types of documents, some public and some private, and the agencies request and receive this information from the parties to a particular transaction as well as from customers and other sources. Examples of the types of documents and information typically requested by the DOJ and FTC include:

- Management presentations and presentations to Boards of Directors;
- Competitive assessments, strategy, and business planning documents;
- Documents produced in the normal course of business including records of rate negotiations, discussions and analyses of various alternatives, and win/loss records;
- Data on the purchases (or sales) of the relevant product, the location of production and/or distribution facilities and their use of the product in question; and
- Data on customers, including customer location and sales volumes, and other strategy and business planning documents related to former, current, or potential customers.

118. In the context of rail shippers, these types of documents can provide a more comprehensive picture of the full set of transportation alternatives available to and used by shippers because they are likely to discuss things such as the location of shipper facilities, the products used at those facilities, the transportation options currently in use by shippers, transportation options that have been used in the past and/or considered in the past, the extent to which shippers have viable product alternatives, and strategies shippers use in negotiations to constrain rails rates.

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<sup>58</sup> *Merger Guidelines* at § 4.1.3.

119. The Board should require shippers to provide data and information relevant to the assessment of geographic alternatives. Some questions that would solicit this information include:

- For the prior 3 years, list each location receiving or making shipments of the commodity at issue. For each location note:
  - Type of facility (e.g., warehouse, distribution center, production facility) and location;
  - Volume of commodity (in cars and tons) at issue that was received/sent at each facility;
  - Locations product was received from/sent to, including names of suppliers and/or customers; and
  - Modes of transportation used to receive/send product at issue, including:
    - For rail transportation, identify each railroad with access to the location, and the volume (in cars and tons) delivered by each railroad in the prior 3 years.
- Provide any documents or data related to the purchase, sale, or transportation of the commodity under review. Documents may include (but are not limited to): strategic plans, management presentations, records of negotiations, and/or any analysis of alternative options.

120. The Board should require shippers to provide data and information relevant to the assessment of geographic alternatives. Some questions that would solicit this information include:

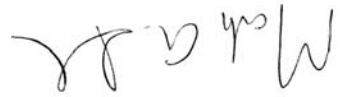
- Provide a description of the commodity at issue and its uses;
- Provide a list of all products that are (or could be) used as substitutes to the product at issue.
- For substitute products that can be used as part of a shipper's production process, please provide (for the prior 3 years):
  - Sources of the substitute product, including name and location of supplier; and the modes of transportation available to receive substitute products.

- Provide any documents and data used in the normal course of business that discuss or describe the use (or potential use) of substitute products, including, for example, strategic plans, cost/benefit analyses, competitive assessments or analyses, and/or budgets or other planning documents.

## V. CONCLUSION

121. The proposed dashboard method provides a useful step toward the application of systematic, rigorous tools to the analysis of competition faced by railroads for particular movements, for use in making rate regulatory and related policy issues, including but not limited to consideration of exemption revocation. However, while the proposed dashboard method provides some useful tools for exploratory data analysis—to evaluate patterns in the waybill data for example—it falls short of a robust decision-making tool for regulators because it fails to consider sufficient sources of information and it fails to use that information to test hypotheses regarding competition. In this statement, I have proposed a modified framework, using a four-step procedure to test for sufficient competition. By implementing these four steps, and determining that regulation is not required (e.g., that an exemption should not be revoked) if any of the steps fails to reject the presence of competition, this approach applies the economic and legislative logic that competition should be favored wherever possible and regulation is a last resort.

I declare the foregoing to be true and correct.



Mark A. Israel  
January 29, 2021

## **Exhibit A**

**Mark A. Israel**  
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**October 2020**

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### **PROFESSIONAL EXPERIENCE HIGHLIGHTS**

- Served as an expert for the Federal Government and private parties in cases involving: fixed and mobile telecommunications, cable television, broadband internet service, airlines, social media, other high technology industries, food distribution, coal and other energy markets, railroads, shipping, health insurance, financial markets, credit cards, retail, and many others.
- Testified in Federal Court, in multiple state courts, in front of the United States Copyright Royalty Judges, in front of international competition authorities, and in arbitration proceedings. Appeared in front of government agencies including DOJ, FTC, and FCC, and state agencies on behalf of numerous clients.
- Submitted expert reports in Federal Court, and affidavits, declarations, and papers to U.S. competition agencies, FCC, DOT, international competition authorities, and state regulators.
- Written numerous academic articles on topics including competition economics, merger policy, telecommunications, airlines, insurance markets, and labor markets. Research published in leading scholarly and applied journals including *The American Economic Review*, *The Rand Journal of Economics*, *International Journal of Industrial Organization*, *The Journal of Competition Law and Economics*, and many others, and presented to business, government, and academic audiences worldwide.
- Co-author of the chapter on Econometrics and Regression Analysis in the ABA Treatise, *Proving Economic Damages: Legal and Economic Issues*, 2017.

### **AREAS OF EXPERTISE**

- Antitrust and competition economics; industrial organization economics
- Applied econometrics
- Economic and econometric analysis of horizontal and vertical mergers
- Economic and econometric analysis of antitrust litigation topics, including: Class certification, damages, and liability issues in cases involving price fixing, exclusive dealing, monopolization, bundling, price discrimination, and exclusionary practices

### **EDUCATION**

- Ph.D., Economics, STANFORD UNIVERSITY, June 2001.
- M.S., Economics, UNIVERSITY OF WISCONSIN-MADISON, August 1992.
- B.A., Economics, ILLINOIS WESLEYAN UNIVERSITY, Summa Cum Laude, May 1991.

## **EMPLOYMENT HISTORY**

Compass Lexecon: *Senior Managing Director*, Head of Compass Lexecon North American Antitrust Practice, January 2016 – Present.

(Previously: *Executive Vice President*, April 2013 – January 2016; *Senior Vice President*, January 2009 – March 2013; *Vice President*, January 2008 – December 2008; *Economist*, January 2006 – December 2007.)

Kellogg School of Management, Northwestern University: *Assistant Professor of Management and Strategy*, 2000 – 2006; *Associate Professor of Management and Strategy*, 2007 – 2008.

State Farm Insurance: *Research Administrator*, 1992 – 1995.

## **RECENT PROFESSIONAL RECOGNITIONS**

Global Competition Review Who's Who Legal, Thought Leader in Competition: 2019, 2020.

Global Competition Review Who's Who Legal, Global Leader in Competition – Economists 2020; Experts – Economics – Competition Economists 2020; Experts – Financial Advisory and Valuation – Quantum of Damages 2020.

Global Arbitration Review's International Who's Who of Commercial Arbitration, Leading Expert Witness, 2018.

## **LIVE TESTIMONIAL EXPERIENCE**

Testimony as Economic Expert on behalf of Peabody Energy Corporation and Arch Coal, Inc., In the Matter of *Federal Trade Commission v. Peabody Energy Corporation and Arch Coal, Inc.*, In the United States District Court for the Eastern District of Missouri, Civil Action No. 4-20-cv-000317-SEP, Deposition: June 29, 2020; Live Trial Testimony: July 24, 2020.

Testimony as Economic Expert on behalf of Nippon Chemi-Con and United Chemi-Con, In the Matter of *In Re Capacitors Antitrust Litigation*, United States District Court for the Northern District of California Division, No. 3:14-CV-03264, Deposition: March 14, 2020.

Testimony as Economic Expert on behalf of Authenticom, Inc., In the Matter of *In Re Dealer Management Systems Antitrust Litigation*, MDL 2817, United States District Court for the Northern District of Illinois Eastern Division, No. 1:18-CV-864, Deposition: January 16-17, 2020.

Testimony as Economic Expert on behalf of Trinity, In the Matter of *Jackson County, Missouri, Individually and on behalf of a class of others similarly situated, v. Trinity Industries, Inc., and Trinity Highway Products, LLC*, In the Circuit Court of Jackson County, Missouri at Independence, Case No. 1516-CV23684, Stage 1 Testimony: May 24, 2017; Stage 2 Deposition: November 14, 2019.

Testimony as Economic Expert on behalf of Joint Applicants, In the Proposed Merger of T-Mobile US, Inc. and Sprint Communications, Inc., Public Utilities Commission, State of California, San Francisco, California, Docket Nos. A.18-07-011 and A.18-07-012, Direct Rebuttal Testimony: January 29, 2019; Live Testimony: February 7, 2019; Direct Supplemental Testimony: November 7, 2019.

Testimony as Economic Expert on behalf of Turner Network Sales, Inc., In the Matter of *DISH Network L.L.C. v. Turner Network Sales, Inc.*, JAMS Arbitration No. 1100103066, Deposition: August 9, 2019; Live Trial Testimony: August 29, 2019.

Testimony of Economic Expert on behalf of Marriott Vacations Worldwide Corporation, et al., In the Matter of *RCHFU, LLC, et al. v. Marriott Vacations Worldwide Corporation, et al.*, In the United States District Court for the Eastern District of Colorado, Civil Action No. 1:16-cv-01301-PAB-GPG, Deposition: July 12, 2019.

Testimony as Economic Expert on behalf of Oscar Insurance Company of Florida, In the Matter of *Oscar Insurance Company of Florida v. Blue Cross and Blue Shield of Florida, Inc., d/b/a/ Florida Blue; Health Options Inc., d/b/a/ Florida Blue HMO; and Florida Health Care Plan Inc., d/b/a/ Florida Health Care Plans*, In the United States District Court Middle District of Florida Orlando Division, Case No. 6:18-cv-01944, Live Preliminary Injunction Hearing Testimony: January 23, 2019.

Testimony as Economic Expert on behalf of Wilh. Wilhelmsen Holding ASA, In the Matter of the *Federal Trade Commission v. Wilh. Wilhelmsen Holding ASA Wilhelmsen Maritime Services As Resolute Fund II, L.P. Drew Marine Intermediate II B.V. and Drew Marine Group, Inc.*, In the United States District Court for the District of Columbia, No. 1:18-cv-00414-TSC, Deposition: May 24, 2018; Live Trial Testimony: June 12, June 13, 2018.

Testimony as Economic Expert on behalf of Joint Sports Claimants, In the Matter of *Determination of Cable Royalty Funds*, United States Copyright Royalty Judges in the Library of Congress, Docket No. 14-CRB-0010-CD (2010-2013), Live Testimony: March 12, 2018.

Testimony as Economic Expert on behalf of Comcast Corporation, In the Matter of *Viamedia, Inc. v. Comcast Corporation and Comcast Spotlight, LP*, In the United States District Court Northern District of Illinois Eastern Division, Case No. 16-cv-5486, Deposition: January 5, 2018.

Testimony as Economic Expert on behalf of Energy Solutions, Inc., In the Matter of the *United States of America v. Energy Solutions, Inc., Rockwell Holdco, Inc., Andrews County Holdings, Inc., and Waste Control Specialists, LLC*, In the United States District Court for the District of Delaware, Civil Action No. 16-cv-01056-SLR, Deposition: April 17, 2017; Live Trial Testimony: May 2, May 3, 2017.

Testimony as Economic Expert on behalf of Facebook, Inc., In the Matter of *Social Ranger, LLC v. Facebook, Inc.*, In the District Court of Delaware, C.A. No. 14-1525-LPS, Deposition: March 6, 2017.

Testimony as Economic Expert on behalf of Regal Entertainment Group, In the Matter of *iPic – Gold Class Entertainment, LLC et al., v. Regal Entertainment Group, AMC Entertainment Holdings, Inc., et al.*, In the District Court of Harris County, Texas, 234<sup>th</sup> Judicial District, No. 2015-68745, Deposition: January 12, 2016, February 15, 2017; Live Trial Testimony: January 21, 2016.

Testimony as Economic Expert on behalf of Anthem Inc., In the Matter of the *United States of America et al. v. Anthem Inc. and Cigna Corp.*, In the District Court of the District of Columbia, No. 16-cv-01493 (ABJ), Deposition: November 9, 2016; Phase 1 Live Trial Testimony: December 1, December 2, 2016; Phase 2 Live Trial Testimony: December 22, 2016.

Testimony as Economic Expert on behalf of Defendants, In the Matter of *Darren Ewert v. Nippon Yusen Kabushiki Kaisha et al.*, Supreme Court of British Columbia, No. S-134895, Deposition: September 14, 2016.

Testimony in Commercial Arbitration on Issues Related to Mobile Wireless Competition, New York, NY, April 12, 2016.

Testimony as Economic Expert on behalf of Federal Trade Commission, In the Matter of *Federal Trade Commission et al. v. Sysco Corporation and USF Holding Corp.*, Civil Action No. 15-cv-00256 (APM), Deposition: April 28, 2015; Live Trial Testimony: May 7, May 8, May 14, 2015.

Appearances in Federal Communications Commission, Economists Panels:

- Comcast/Time Warner, January 2015
- AT&T/T-Mobile, July 2011
- Comcast/NBCUniversal, August 2010

Appearance before California Public Utility Commission, Public Hearings on Comcast/Time Warner Merger, Los Angeles, April 2015.

Appearance as Economic Expert in front of Department of Justice, Federal Trade Commission, Federal Communications Commission, and State Regulatory Agencies in many additional transactions, including: Danaher/NetScout, AT&T/Leap Wireless, T-Mobile/MetroPCS, American Airlines/US Airways, SpectrumCo/Cox/Verizon Wireless, oneworld antitrust immunity application, PepsiCo/bottlers, Houghton Mifflin/Harcourt, Chicago Mercantile Exchange/Chicago Board of Trade.

## **EXPERT REPORTS, AFFIDAVITS, AND DECLARATIONS**

Expert Report of Mark A. Israel, Ph.D., “In Re Comtech/Gilat Merger Litigation,” Court of Chancery of the State of Delaware, Consolidated C.A. No. 2020-0605-JRS, September 24, 2020.

Declaration of Mark Israel and Allan Shampine, In the Matter of *AMC Networks Inc. v. AT&T Inc.*, Before the Federal Communications Commission, MB Docket No. 20-254, File No. CSR-8993, August 20, 2020.

Expert Report of Mark A. Israel, In the Matter between *Ryan Kett and Mitsubishi Materials Corporation, Mitsubishi Cable Industries, Ltd., Mitsubishi Shindoh Co., Ltd., Mitsubishi Aluminum Co., Ltd., Tachibana Metal Mfg. Co., Ltd., and Diamet Corporation*, In the Supreme Court of British Columbia, Case No. VLC-S-S-1813758, July 15, 2020.

Expert Reports of Mark A. Israel, Ph.D., In the Matter of *Federal Trade Commission v. Peabody Energy Corporation and Arch Coal, Inc.*, In the United States District Court for the Eastern District of Missouri, Civil Action No. 4-20-cv-000317-SEP, Initial Report: May 26, 2020; Reply Report: June 19, 2020.

Expert Reports of Mark A. Israel, Ph.D., “In Re Dealer Management Systems Antitrust Litigation,” United States District Court for the Northern District of Illinois Eastern Division, MDL 2817, No. 1:18-CV-864, Initial Report: August 26, 2019; Reply Report: December 19, 2019.

Expert Reports of Mark A. Israel, Ph.D., “In Re Domestic Airline Travel Antitrust Litigation,” United States District Court for the District of Columbia, MDL Docket No. 2656, Misc. No. 15-1404 (CKK), Initial Report: September 30, 2019; Rebuttal Report: November 14, 2019.

Expert Reports of Mark A. Israel, In the Matter of *DISH Network L.L.C. v. Turner Network Sales, Inc.*, JAMS Arbitration No. 1100103066, Initial Report: July 23, 2019; Reply Report: August 2, 2019.

Submission of Mark A. Israel, Maya Meidan, and Robert J. Calzaretta, Jr., “The Atlantic Joint Business Generates Substantial Consumer Benefits,” Competition and Markets Authority, United Kingdom, July 1, 2019.

Submission of Philip Haile and Mark Israel, “Alternative Approaches to Airport Slot Allocation: Objectives and Challenges,” Department for Transport, United Kingdom, June 20, 2019.

Submission of Mark A. Israel, Maya Meidan, and Robert J. Calzaretta, Jr., “The Atlantic Joint Business Has Not Harmed Competition on Nonstop Overlap Routes, Including Focus Routes,” Competition and Markets Authority, United Kingdom, June 14, 2019.

Expert Reports of Mark A. Israel, In the Matter of *RCHFU, LLC, et al. v. Marriott Vacations Worldwide Corporation, et al.*, In the United States District Court for the District of Colorado, Civil Action No. 16-01301-PAB-GPG, Initial Report: December 28, 2018; Supplemental Rebuttal Report, June 14, 2019.

Submission of Mark Israel, “The Fidelity/Stewart Merger Does Not Raise Competitive Concerns in the New York Title Insurance Industry,” Revised Section 1506 Application Regarding the Proposed Acquisition of Stewart Title Insurance Company by Fidelity National Financial, Inc., New York State Department of Financial Services, April 12, 2019.

Second Report of Dr. Mark A. Israel, Between *UK Trucks Claim Limited and (1) – (5) Fiat Chrysler Automobiles NV and (1) – (4) MAN Truck & Bus AG & ORS*, In the Competition Appeal Tribunal, Case No. 1282/7/7/18, April 11, 2019.

- Expert Report of Mark A. Israel, In the Matter between *Ryan Kett, Erik Oun and Jim Wong and Kobe Steel, Ltd., Shinko Metal Products Co., Ltd., Shinko Aluminum Wire Co., Ltd., Shinko Wire Stainless Company, Ltd., Kobelco & Materials Copper Tube Co., and Nippon Koshuha Steel Co., Ltd.*, In the Supreme Court of British Columbia, Case No. S-1710805, March 28, 2019.
- Expert Report of Dr. Mark A. Israel, Between *Road Haulage Association and (1) – (10) MAN SE and Others and (1) Daimler AG, (2) Volvo Lastvagnar Aktiebolag*, In the Competition Appeal Tribunal, Case No. 1289/7/7/18, March 22, 2019.
- Submission of Robert J. Calzaretta, Jr., Mark A. Israel, and Maya Meidan, “Assessing the Effects of ATI and JV Overlaps on Nonstop Fares: An Event Study Approach,” submitted as part of a Supplement to Joint Motion to Amend Order 2010-7-8 for Approval of and Antitrust Immunity for Amended Joint Business Agreement, In the Application of American Airlines, Inc., British Airways PLC, OpenSkies SAS, Iberia Líneas Aéreas de España, S.A., Finnair OYJ, Aer Lingus Group DAC, Before the U.S. Department of Transportation, Washington, DC, Docket DOT-OST-2008-0252-, January 11, 2019.
- Declarations of Mark A. Israel, In the Matter of *Oscar Insurance Company of Florida v. Blue Cross and Blue Shield of Florida, Inc., d/b/a Florida Blue; Health Options Inc., d/b/a Florida Blue HMO; and Florida Health Care Plan Inc., d/b/a Florida Health Care Plans*, In the United States District Court Middle District of Florida Orlando Division, Case No. 6:18-cv-01944, Declaration: November 19, 2018; Supplemental Declaration: December 21, 2018.
- Reply Declaration of Mark Israel, Michael Katz, and Bryan Keating, In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation, Consolidated Applications for Consent to Transfer Control of Licenses and Authorizations, Federal Communications Commission, WT Docket No. 18-197, September 17, 2018.
- Expert Report of Gustavo Bamberger, Robert Calzaretta, and Mark Israel, In the Joint Application of Hawaiian Airlines, Inc. and Japan Airlines, Co., Ltd., Appendix 6 to “Joint Application for Approval of and Antitrust Immunity for Alliance Agreements,” Department of Transportation, Case No. DOT-OST-2018-0084, June 13, 2018.
- Expert Reports of Mark A. Israel, In the Matter between *Cygnus Electronics Corporation and Sean Allott and Panasonic Corporation et al.*, In the Ontario Superior Court of Justice, Court File No. 3795/14CP, Initial Report: November 17, 2017; Reply Report: February 23, 2018; Supplemental Report: May 22, 2018.
- Expert Report of Mark A. Israel, In the Matter of the *Federal Trade Commission v. Wilh. Wilhelmsen Holding ASA Wilhelmsen Maritime Services As Resolute Fund II, L.P. Drew Marine Intermediate II B.V. and Drew Marine Group, Inc.*, In the United States District Court for the District of Columbia, No. 1:18-cv-00414-TSC, May 11, 2018.
- Reports of Dr. Mark A. Israel, In the Matter of *Viamedia, Inc. v. Comcast Corporation and Comcast Spotlight, LP*, In the United States District Court for the Northern District of Illinois Eastern Division, Case No. 16-cv-5486, Rebuttal Report: November 30, 2017; Errata Sheet for Rebuttal Report: January 4, 2018.

Declaration of Mark A. Israel, In the Matter between *Robert Foster and Murray Davenport and Sears Canada Inc. et al.*, In the Ontario Superior Court of Justice, Court File No. 766-2010 CP, November 1, 2017.

Expert Report of Mark Israel and Bryan Keating, “Economic Analysis of Dr. Evans’ Claims as They Relate to *Restoring Internet Freedom*,” Federal Communications Commission, WC Docket No. 17-108, October 31, 2017.

Written Rebuttal Testimony of Dr. Mark A. Israel, In the Matter of Distribution of Cable Royalty Funds, Before the Copyright Royalty Judges, Washington, D.C., No. 14-CRB-0010-CD, September 15, 2017.

Declaration of Mark A. Israel, Allan L. Shampine, and Thomas A. Stemwedel, In the Matter of Restoring Internet Freedom, Federal Communications Commission, WC Docket No. 17-108, July 17, 2017.

Expert Report of Dr. Mark A. Israel, In the Matter of *St. Clair County, Illinois, and Macon County, Illinois, Individually and on behalf of all other counties in the State of Illinois, v. Trinity Industries, Inc. and Trinity Highway Products, LLC*, In the United States District Court for the Southern District of Illinois, Civil Action No.: 3:14-cv-1320, April 25, 2017.

Expert Reports of Mark A. Israel, In the Matter of the *United States of America v. Energy Solutions, Inc., Rockwell Holdco, Inc., Andrews County Holdings, Inc., and Waste Control Specialists, LLC*, In the United States District Court for the District of Delaware, Civil Action No. 16-cv-01056-SLR, Initial Report: March 27, 2017; Rebuttal Report: April 10, 2017.

Expert Report of Mark A. Israel, In the Matter of *Jackson County, Missouri, Individually and on behalf of a class of others similarly situated, v. Trinity Industries, Inc., and Trinity Highway Products, LLC*, In the Circuit Court of Jackson County, Missouri at Independence, Case No. 1516-CV23684, March 24, 2017.

Expert Report of Mark A. Israel, In the Matter of *Honeywell International Inc. v. iControl Networks, Inc. and Alarm.com Holdings, Inc.*, In the United States District Court for the District of New Jersey, No. 2:17-cv-01227, February 26, 2017.

Written Direct Testimony of Dr. Mark A. Israel, In the Matter of Distribution of Cable Royalty Funds, Before the Copyright Royalty Judges, Washington, D.C., No. 14-CRB-0010-CD (2010-13), December 22, 2016.

Expert Report of Mark Israel, In the Matter of *Social Ranger, LLC v. Facebook, Inc.*, In the United States District Court for the District of Delaware, C.A. No. 14-1525-LPS, November 23, 2016.

Expert Report of Mark A. Israel, In the Matter between *Darren Ewert and DENSO Corporation et al.*, In the Supreme Court of British Columbia, Vancouver Registry, No. S-135610, November 15, 2016.

Expert Reports of Mark A. Israel, In the Matter of the *United States of America et al. v. Anthem Inc. and Cigna Corp.*, In the United States District Court, District of Columbia, No. 16-cv-01493 (ABJ), Initial Report: October 7, 2016; Supplemental and Rebuttal Report: October 28, 2016.

Verified Statements of Mark Israel and Jonathan Orszag, “Review of Commodity, Boxcar, and TOFC/COFC Exemptions,” Surface Transportation Board, Docket No. EP 704 (Sub-No. 1), Initial Verified Statement: July 26, 2016; Reply Verified Statement: August 26, 2016.

Declarations of Mark Israel, Daniel Rubinfeld, and Glenn Woroch, “Analysis of the Regressions and Other Data Relied Upon in the Business Data Services FNPRM And a Proposed Competitive Market Test,” Federal Communications Commission, WC Docket Nos. 16-143, 15-247, 05-25, RM-10593, Second Declaration: June 28, 2016; Third Declaration: August 9, 2016.

Expert Declaration of Mark A. Israel, In the Matter of *Liberian Broadcasting, Inc. and LBI Media, Inc. v. Comcast Corporation and Comcast Cable Communications, LLC*, Federal Communications Commission, MB Docket No. 16-121, June 7, 2016.

Expert Report of Mark A. Israel, In the Matter of *La Crosse County, Individually, and on behalf of all others similarly situated v. Trinity Industries, INC. and Trinity Highway Products, LLC*, In the United States District Court, Western District of Wisconsin, Case No. 3:15-cv-00117-scl, May 27, 2016.

Expert Report of Mark A. Israel, In the Matter between *Darren Ewert and Nippon Yusen Kabushiki Kaisha et al.*, In the Supreme Court of British Columbia, Vancouver Registry, No. S-134895, May 20, 2016.

Declarations of Mark Israel, Daniel Rubinfeld, and Glenn Woroch, In the Matter of Special Access Rates for Price Cap Local Exchange Carriers, Federal Communications Commission, WC Docket No. 05-25, Declaration: February 19, 2016; Supplemental Declaration: March 24, 2016; Second Supplemental Declaration: April 20, 2016.

Declaration of Mark Israel, Daniel Rubinfeld, and Glenn Woroch, “Competitive Analysis of the FCC’s Special Access Data Collection,” Federal Communications Commission, WC Docket No. 05-25, January 26, 2016.

Declaration of Dr. Mark Israel, In the Matter of *iPic – Gold Class Entertainment, LLC et al.*, v. *Regal Entertainment Group, AMC Entertainment Holdings, Inc., et al.*, In the District Court of Harris County, Texas, 234<sup>th</sup> Judicial District, No. 2015-68745, January 18, 2016.

Declaration of Dennis Carlton, Mark Israel, Allan Shampine & Hal Sider, “Investigation of Certain Price Cap Local Exchange Carrier Business Data Services Tariff Pricing Plans,” Federal Communications Commission, WC Docket No. 15-247, January 7, 2016.

Declaration of Mark A. Israel, Attached to “Response of AT&T Mobility LLC to Notice of Apparent Liability for Forfeiture,” Federal Communications Commission, File No. EB-IHD-14-00017504, July 17, 2015.

Reports in the Matter of *Federal Trade Commission et al. v. Sysco Corporation and USF Holding Corp.*, In the United States District Court for the District of Columbia, Civil Action No. 1:15-cv-00256 (APM), Declaration: February 18, 2015; Report: April 14, 2015; Rebuttal Report: April 21, 2015.

Declaration of Mark A. Israel, Bryan G. M. Keating, and David Weiskopf, “Economic Analysis of the Effect of the Comcast-TWC Transaction on Voice and Broadband Services in California,” December 3, 2014.

Expert Report of Mark A. Israel, “Economic Analysis of the Effect of the Comcast-TWC Transaction on Broadband: Reply to Commenters,” Federal Communications Commission, MB Docket No. 14-57, September 22, 2014.

Supplemental Declaration of Mark Israel and Allan Shampine, In the Matter of Amendment of the Commission’s Rules Related to Retransmission Consent, Appendix A to “Reply Comments of the National Association of Broadcasters,” Federal Communications Commission, MB Docket No. 10-71, July 24, 2014.

Declaration of Mark Israel and Allan Shampine, In the Matter of Amendment of the Commission’s Rules Related to Retransmission Consent, Appendix B to “Comments of the National Association of Broadcasters,” Federal Communications Commission, MB Docket No. 10-71, June 26, 2014.

Expert Report of Mark A. Israel, “Implications of the Comcast/Time Warner Cable Transaction for Broadband Competition,” Federal Communications Commission, MB Docket No. 14-57, April 8, 2014.

Declaration of Michael L. Katz, Philip A. Haile, Mark A. Israel, and Andres V. Lerner, “Sprint’s Proposed Weighted Spectrum Screen Defies Economic Logic and Is Inconsistent with Established Facts,” Federal Communications Commission, WT Docket No. 12-269, March 14, 2014.

Reply Declaration of Mark A. Israel, “Competitive Effects and Consumer Benefits from the Proposed Acquisition of Leap Wireless by AT&T: A Reply Declaration,” Federal Communications Commission, WT Docket No. 13-193, October 23, 2013.

Declaration of Mark A. Israel, “An Economic Analysis of Competitive Effects and Consumer Benefits from the Proposed Acquisition of Leap Wireless by AT&T,” Federal Communications Commission, WT Docket No. 13-193, August 1, 2013.

Supplemental Reply Declaration of Michael L. Katz, Philip A. Haile, Mark A. Israel, and Andres V. Lerner, “Comments on Appropriate Spectrum Aggregation Policy with Application to the Upcoming 600 MHz Auction,” Federal Communications Commission, WT Docket No. 12-269, June 13, 2013.

Reply Declaration of Michael L. Katz, Philip A. Haile, Mark A. Israel, and Andres V. Lerner, “Comment on the Submission of the U.S. Department of Justice Regarding Auction Participation Restrictions,” Federal Communications Commission, WT Docket No. 12-269, June 13, 2013.

Reply Declaration of Michael L. Katz, Philip A. Haile, Mark A. Israel, and Andres V. Lerner, “Spectrum Aggregation Policy, Spectrum-Holdings-Based Bidding Credits, and Unlicensed Spectrum,” Federal Communications Commission, GN Docket No. 12-268, March 12, 2013.

Declaration of Igal Hendel and Mark A. Israel, “Econometric Principles That Should Guide the Commission’s Analysis of Competition for Special Access Service,” Federal Communications Commission, WC Docket No. 05-25, February 11, 2013.

Declarations of Mark A. Israel and Michael L. Katz, “Economic Analysis of Public Policy Regarding Mobile Spectrum Holdings,” Federal Communications Commission, WT Docket No. 12-269, Declaration: November 28, 2012; Reply Declaration: January 7, 2013.

Declaration of Mark Israel, “An Economic Assessment of the Prohibition on Exclusive Contracts for Satellite-Delivered, Cable-Affiliated Networks,” Federal Communications Commission, MB Docket Nos. 12-68, 07-18, & 05-192, September 6, 2012.

Expert Report of Mark Israel, “Implications of the Verizon Wireless & SpectrumCo/Cox Commercial Agreements for Backhaul and Wi-Fi Services Competition,” Federal Communications Commission, WT Docket No. 12-4, August 1, 2012.

Expert Report of Mark A. Israel, Michael L. Katz, and Allan L. Shampine, “Promoting Interoperability in the 700 MHz Commercial Spectrum,” Federal Communications Commission, WT Docket No. 12-69, July 16, 2012.

Affidavits of Dr. Mark A. Israel in the Matter of *Bloomberg L.P. v. Comcast Cable Communications, LLC*, Federal Communications Commission, MB Docket No. 11-104, Declaration: June 21, 2012; Declaration: June 8, 2012; Supplemental Declaration: September 27, 2011; Declaration: July 27, 2011.

Expert Report of Robert Willig, Mark Israel, Bryan Keating, and Jonathan Orszag, “Response to Supplementary Comments of Hubert Horan,” Docket DOT-OST-2009-1055, October 22, 2010.

Expert Report of Robert Willig, Mark Israel, Bryan Keating, and Jonathan Orszag, “Measuring Consumer Benefits from Antitrust Immunity for Delta Air Lines and Virgin Blue Carriers,” Docket DOT-OST-2009-1055, October 13, 2010.

Expert Report of Mark Israel and Michael L. Katz, “Economic Analysis of the Proposed Comcast-NBCU-GE Transaction,” Federal Communications Commission, MB Docket No. 10-56, July 20, 2010.

Expert Report of Mark Israel and Michael L. Katz, “The Comcast/NBCU Transaction and Online Video Distribution,” Federal Communications Commission, MB Docket No. 10-56, May 4, 2010.

Expert Report of Mark Israel and Michael L. Katz, “Application of the Commission Staff Model of Vertical Foreclosure to the Proposed Comcast-NBCU Transaction,” Federal Communications Commission, MB Docket No. 10-56, February 26, 2010.

Expert Report of Robert Willig, Mark Israel, and Bryan Keating, “Competitive Effects of Airline Antitrust Immunity: Response of Robert Willig, Mark Israel, and Bryan Keating” in Docket DOT-OST-2008-0252, January 11, 2010.

Affidavit of Dr. Mark A. Israel on Class Certification in the Matter of Puerto Rican Cabotage Antitrust Litigation, in the United States District Court for the District of Puerto Rico, MDL Docket No. 3:08-md-1960 (DRD), December 10, 2009.

Expert Report of Robert Willig, Mark Israel, and Bryan Keating, “Competitive Effects of Airline Antitrust Immunity,” Docket DOT-OST-2008-0252, September 8, 2009.

Expert Report and Supplemental Expert Report of Dennis W. Carlton and Mark Israel in the Matter of *Toys “R” Us-Delaware, Inc., and Geoffrey Inc. v. Chase Bank USA N.A.*, in American Arbitration Association New York, New York, Commercial Arbitrations No. 13-148-02432-08, Expert Report: February 27, 2009; Supplemental Expert Report: March 20, 2009.

Expert Reports of James Levinsohn and Mark Israel, In the Matter of 2006 NPM Adjustment Proceeding pursuant to Master Settlement Agreement, October 6, 2008, January 16, 2009, March 10, 2009.

### **SELECTED OTHER EXPERT WORK IN REVIEW OF MERGERS/TRANSACTIONS**

*Successful acquisition of Innovative Industries, Inc. by Ex Libris. 2020.* Served as lead economist in interactions with FTC. Demonstrated that the acquisition would not harm competition due to the *de minimis* extent of head-to-head competition between Ex Libris and Innovative and the recent decline of Innovative’s business. FTC closed investigation allowing acquisition to proceed with no conditions.

*Successful acquisition of TD Ameritrade by Charles Schwab. 2020.* Served as lead economist in interactions with DOJ. Presented analyses demonstrating broad market for investor dollars rather than narrow market for RIA Custodian Services. DOJ closed investigation allowing acquisition to proceed with no conditions.

*Successful acquisition of Reinhart Foodservice by Performance Food Group Company. 2019.* Served as lead economics expert on behalf of the parties in the FTC’s investigation of the merger. Presented detailed data analyses showing ample competition and lack of harm to competition in any geographic market. FTC closed the investigation with no divestitures required in late 2019.

*Successful acquisition of SGA’s Food Group of companies by US Foods. 2019.* Served as lead economic expert on behalf of the parties in the FTC’s investigation of the merger. Presented detailed economics and econometric analyses showing ample competition and lack of harm to competition in any geographic market. FTC cleared the merger subject to divestitures in three geographic markets in the Fall of 2019.

*Successful acquisition of Time Warner by AT&T Inc. 2017-2019.* Lead economist throughout the DOJ investigation. Then director of all economic work during trial, serving as the central connection point between all experts and counsel and directing development of all aspects of the economic case. Defendants ultimately prevailed in trial and the merger closed in June 2018.

*Successful acquisition of Keystone Foods by Tyson Foods, Inc. 2018.* Served as lead economic expert for U.S. jurisdiction. Presented economic analyses demonstrating that competition would remain strong post-merger. Ultimately, antitrust agencies in the U.S., China, Japan, and Korea cleared the transaction.

*Successful acquisition of NEX Group PLC by CME Group Inc.* 2018. Co-lead economic expert with Thomas Stemwedel. Presented several econometric analyses demonstrating that Treasury futures contracts and cash Treasury securities were economic complements rather than substitutes. Based heavily on these Compass Lexecon submissions, the DOJ and CMA closed their investigations without requiring any divestitures.

*Successful acquisition of VCA Inc. by Mars, Inc.* 2017. Co-lead economic expert with Mary Coleman. Made multiple presentations to FTC demonstrating ample competition in general, emergency, and specialty veterinary services, including econometric analyses showing lack of direct competitive impact of Mars and VCA on one another. Transaction was ultimately cleared subject to a small number of divestitures.

*Successful acquisition of Mobileye by Intel.* 2017. Served as lead economic expert for Intel. Assisted counsel in preparing FTC presentations and materials demonstrating lack of significant head-to-head competition and lack of valid vertical foreclosure theories. Investigation was closed without Second Request.

*FTC litigation against DraftKings, Inc. and FanDuel Inc. (Civil Action No. 17-cv-1195 (KBJ)).* 2017. Served as lead economic expert for FTC and prepared to serve as FTC's testifying expert against the merger, prior to the parties' abandonment of the proposed merger. Developed economic and econometric evidence that the merging parties were closest substitutes and thus likely would have increased prices as a result of their proposed merger.

*Successful merger of ASE Group and SPIL.* 2017. Lead economic expert on behalf of ASE Group. Submitted reports and testified to the Taiwan Fair Trade Commission, which ultimately cleared the transaction, then made multiple presentations to U.S. FTC, which also cleared the transaction. Economic analyses focused on implications of profit margins for market definition and competitive effects, ultimately demonstrating that the transaction was unlikely to cause significant harm to competition.

*Successful acquisition of Alarm.com of two business units (Connect and Piper) from iControl Networks.* 2017. Led team that demonstrated substantial and growing competition in home security and connected home marketplace and thus lack of competitive harm from acquisition. Work focused on importance of downstream market definition as well as empirical evidence of impact of competition on Alarm.com pricing and profitability.

*Successful acquisition of Samsung Electronics, Ltd.'s printer business by HP Inc.* 2016. Led team in evaluating the competitive effects of the acquisition, including assessing shares and competitive effects in overlap areas. Notably, the transaction gained regulatory approval in the U.S. during the initial review period without issuing a Second Request.

*Successful acquisition of Sun Products Corp. by Henkel AG.* 2016. Led team demonstrating lack of competitive impact despite overlaps in laundry detergent and related products.

*Successful acquisition of Starwood Hotels & Resorts by Marriott International.* 2016. Led team that performed detailed analysis of competitive conditions, extensive econometric analysis of pricing, and full review of Marriott's internal pricing models to demonstrate that Starwood and Marriott were not close competitors, combined ownership of the brands would not lead to upward pricing pressure, and competition would remain robust post-merger.

*Successful acquisition of PR Newswire by GTCR.* 2016. Lead economic expert for GTCR. Made presentations to DOJ showing lack of competitive harm from the transaction, based on detailed analysis of win/loss data, including calculations showing no possible upward pricing pressure (UPP) concerns regardless of the level of margins.

*Successful acquisition of Schurz Communications' Broadcast Stations by Gray Television.* 2015. Lead economic expert for Gray. Made presentations to DOJ demonstrating output expanding effects of proposed transaction in light of the scale economies in television production and advertising and the small size of the DMAs affected by the transaction.

*Successful acquisition of the Communications Business of Danaher Corporation by NetScout Systems.* 2015. Lead economic expert for NetScout. Made presentations to DOJ describing proper economic framework for analysis of competition and potential merger harms, and demonstrated that the presence of multiple viable competitors and numerous other credible threats to be used by powerful buyers in a dynamic industry made theories of anti-competitive harm from the merger implausible.

*Successful acquisition of Windmill Distribution Co. by Manhattan Beer Distributors.* 2015. Lead economic expert for Manhattan Beer Distributors. Submitted White Paper to DOJ demonstrating, based on margin data, that the merger would be highly unlikely to lead to anti-competitive effects. Transaction was granted early termination from the Hart Scott Rodino process by the DOJ.

*Proposed acquisition of Time Warner Cable by Comcast Corporation.* 2014-2015. Served as lead economic expert on broadband issues on behalf of Comcast Corporation. Submitted multiple Declarations and made multiple presentations to DOJ and FCC, explaining lack of horizontal, bargaining, or vertical/foreclosure concerns with regard to broadband competition as a result of the transaction.

*Successful acquisition of Leap Wireless by AT&T.* 2014. Lead economic expert for AT&T. Submitted multiple Declarations to FCC and made presentation to DOJ, demonstrating the transaction would generate substantial consumer benefits, while generating at most minimal upward pricing pressure in a properly defined mobile wireless services market and no issues related to spectrum concentration or other competitive concerns.

*Successful merger of American Airline and US Airways.* 2013. Lead consulting expert, managing Compass Lexecon team of over 25 economists supporting multiple experts. Made multiple presentations to DOJ, worked on expert reports in litigation, and assisted counsel with the analysis leading to settlement of litigation, permitting transaction to close.

*Successful merger of T-Mobile USA and MetroPCS.* 2013. Lead economic expert for T-Mobile USA. Conducted economic analyses of competitive effects of the transaction, as well as consumer benefits from reduced costs and increased network quality. Presented analyses to both DOJ and FCC.

*FTC investigation of acquisition of Dollar Thrifty Automotive Group by Hertz.* 2012. Served as a lead economic expert for FTC and prepared to serve as FTC's testifying expert against the merger, prior to case settlement. Conducted empirical analyses based on previous rental car mergers demonstrating likely price increases from the transaction.

*Decision by Federal Communications Commission not to extend the ban on exclusive contracts for satellite-delivered, cable-affiliated networks.* 2012. Lead economic expert for National Cable and Telecommunications Association. Submitted economic analysis demonstrating that the ban on exclusive distribution of satellite-delivered, cable affiliated networks is no longer warranted given increased marketplace competition. FCC made decision to allow the ban to sunset.

*Successful sale of wireless spectrum by SpectrumCo and Cox (“Cable Companies”) to Verizon Wireless and successful completion of related commercial agreements.* 2012. On behalf of the Cable Companies, performed economic analyses demonstrating lack of competitive harm from the transaction on markets for backhaul and Wi-Fi services. Presented analyses to FCC.

*Successful acquisition by LIN Media of broadcast television stations from NDTV.* 2012. Lead economic expert for LIN Media. Prepared economic analysis demonstrating lack of competitive concern over potential issues related to Shared Service and Joint Sale Arrangements.

*Proposed acquisition of T-Mobile USA by AT&T.* 2011. Served as one of the lead economists, initially for T-Mobile (along with Michael Katz) and ultimately for both parties (along with Michael Katz and Dennis Carlton). Made multiple presentations to DOJ and FCC. Appeared in FCC Workshop, ex parte meeting.

*Successful application for antitrust immunity by Delta and Virgin Blue.* 2010. Together with Robert Willig, Bryan Keating, and Jon Orszag, prepared economic analyses demonstrating substantial net consumer benefits from antitrust immunity. Submitted results in expert reports to Department of Transportation.

*Successful joint venture between Comcast and NBC Universal (and ultimate full acquisition of NBC Universal by Comcast).* 2010. Served as one of the lead economists (along with Michael Katz) on behalf of the merging parties. Wrote multiple reports submitted to FCC (with Michael Katz) demonstrating lack of significant competitive concerns from the transaction. Made multiple presentations to DOJ and FCC. Appeared in FCC Workshop of economists, ex parte meeting.

*Successful application for antitrust immunity for oneworld alliance and associated joint venture of American Airlines, British Airways, and Iberia Airlines.* 2009-2010. Together with Robert Willig and Bryan Keating, prepared economic analyses demonstrating substantial net consumer benefits associated with antitrust immunity for the joint venture. Submitted results in expert reports to Department of Transportation.

*Successful acquisition by PepsiCo of bottlers, PBG and PAS.* 2009. Performed econometric and simulation analyses demonstrating pro-competitive effect of merger on PepsiCo’s own brands, other brands distributed by PBG and PAS, and overall marketplace. Presented results to FTC (together with Dennis Carlton).

*Successful merger of Delta Airlines and Northwest Airlines.* 2008. In support of Dennis Carlton, developed empirical and theoretical analyses to demonstrate merger’s pro-competitive nature. Work focused on (ultimately settled) private litigation opposing the merger.

*Successful acquisition of Harcourt Education by Houghton Mifflin.* 2007. Along with Daniel Rubinfeld and Frederick Flyer, developed econometric analyses demonstrating lack of competitive harm from proposed merger. Presented results to DOJ.

*Successful acquisition of Chicago Board of Trade by Chicago Mercantile Exchange.* 2007. Along with Robert Willig and Hal Sider, developed and presented multiple empirical analyses demonstrating lack of competitive harm from merger. Submitted multiple white papers and made multiple presentations to DOJ.

### **SELECTED OTHER EXPERT/CONSULTING WORK**

Led team supporting Dennis Carlton's testimony in Toshiba/Hannstar TFT-LCD Antitrust litigation vs. Plaintiff Best Buy, 2013.

Led team supporting Dennis Carlton's testimony in Toshiba's TFT-LCD Class Action Antitrust litigation. Named Litigation Matter of the Year for 2012 by *Global Competition Review*, 2012.

As economic expert for US Airways, developed econometric analysis of air traffic at major US airports, presented to Philadelphia Airport management team, 2011.

Prepared analysis of the competitive impact of low-cost-carrier competition in Washington, D.C. and New York airports. Filed with DOT, 2011.

On behalf of major pharmaceutical firm, developed econometric model to forecast pharmaceutical expenditures, 2009.

Developed econometric model to measure of the importance of network effects in credit cards in the context of measuring damages incurred by a major credit card issuer, 2007-2008.

### **OTHER CONFIDENTIAL CONSULTING WORK IN THE FOLLOWING INDUSTRIES**

Automobiles and Components

Consumer Durables

Consumer Services

Financial Services

Energy

Food, Beverage, and Tobacco

Healthcare Equipment and Services

Media

Pharmaceuticals, Biotechnology, and Life Sciences

Retail

Semiconductors and Semiconductor Equipment

Software and Related Services

Technology: Hardware and Equipment

Telecommunication Services

Transportation

Utilities

## **PUBLICATIONS**

“An Evaluation of the Impact of the 2010 Horizontal Merger Guidelines,” (with Dennis W. Carlton), SSRN, [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3547653](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3547653), March 2020.

“Lessons from AT&T/Time Warner,” (with Dennis W. Carlton and Allan L. Shampine), *Competition Policy International*, July 2019.

“Are You Pushing Too Hard? Lower Negotiated Input Prices as a Merger Efficiency,” (with Thomas A. Stemwedel and Ka Hei Tse), Volume 82, Issue 2, Pages 623-642, in the *Antitrust Law Journal*, April 2019.

“Vertical Integration in Multichannel Television Markets: Revisiting Regional Sports Networks Using Updated Data,” (with Georgi Giosov, Nauman Ilias, and Allan Shampine), Volume 4:1 in *The Criterion Journal on Innovation*, 2019.

“Are Legacy Airline Mergers Pro- or Anti-Competitive? Evidence from Recent U.S. Airline Mergers,” (with Dennis Carlton, Ian MacSwain, and Eugene Orlov), Volume 62, Pages 58-95, in the *International Journal of Industrial Organization*, January 2019.

“Competitive Effects of International Airline Cooperation,” (with Robert J. Calzaretta and Yair Eilat), Volume 13, Issue 3, Pages 501-548, in the *Journal of Competition Law & Economics*, September 2017.

“Econometrics and Regression Analysis,” (with Chris Cavanagh, Paul Denis, and Bryan Keating), Chapter 6 in the *American Bar Association’s Proving Antitrust Damages: Legal and Economic Issues, Third Edition*, 2017.

“Complementarity without Superadditivity,” (with Steven Berry, Philip Haile, and Michael Katz), Volume 151, Pages 28-30, in *Economics Letters*, February 2017.

“Antitrust in a Mobile World,” (with Yonatan Even, Jonathan M. Jacobson, Scott Martin, and Dr. Helen Weeds), Chapter 17 of *International Antitrust Law & Policy: Fordham Competition Law 2015*, Edited by James Keyte, Juris Publishing, Inc., 2016.

“Buyer Power in Merger Review,” (with Dennis W. Carlton and Mary Coleman), Chapter 22 of *The Oxford Handbook of International Antitrust Economics*, Volume 1, Roger D. Blair and D. Daniel Sokol, eds, Oxford University Press, 2015.

“The Evolution of Internet Interconnection from Hierarchy to ‘Mesh’: Implications for Government Regulation,” (with Stanley M. Besen), *Information Economics and Policy*, December 2013.

“Airline Network Effects and Consumer Welfare,” (with Bryan Keating, Dan Rubinfeld, and Robert Willig), *Review of Network Economics*, November 2013.

- “The Delta-Northwest Merger: Consumer Benefits from Airline Network Effects (2008),” (with Bryan Keating, Daniel L. Rubinfeld, and Robert D. Willig), *The Antitrust Revolution*, Sixth Edition, Edited by John E. Kwoka, Jr. and Lawrence J. White, Oxford University Press, New York, July 2013.
- “Proper Treatment of Buyer Power in Merger Review,” (with Dennis W. Carlton), *Review of Industrial Organization*, July 2011.
- “Response to Gopal Das Varma’s Market Definition, Upward Pricing Pressure, and the Role of the Courts: A Response to Carlton and Israel,” (with Dennis W. Carlton), *The Antitrust Source*, December 2010.
- “Will the New Guidelines Clarify or Obscure Antitrust Policy?” (with Dennis W. Carlton), *The Antitrust Source*, October 2010.
- “Should Competition Policy Prohibit Price Discrimination?” (with Dennis W. Carlton), *Global Competition Review*, 2009.
- “The Empirical Effects of Collegiate Athletics: An Update Based on 2004-2007 Data,” (with Jonathan Orszag), Paper commissioned by National Collegiate Athletic Association, available at [http://www.epi.soe.vt.edu/perspectives/policy\\_news/pdf/NCAASpending.pdf](http://www.epi.soe.vt.edu/perspectives/policy_news/pdf/NCAASpending.pdf), February 2009.
- “Services as Experience Goods: An Empirical Examination of Consumer Learning in Automobile Insurance,” *The American Economic Review*, December 2005.
- “Tenure Dependence in Consumer-Firm Relationships: An Empirical Analysis of Consumer Departures from Automobile Insurance Firms,” *The Rand Journal of Economics*, Spring 2005.
- “The Impact of Youth Characteristics and Experiences on Transitions Out of Poverty,” (with Michael Seeborg), *Journal of Socio-Economics*, 1998.
- “Racial Differences in Adult Labor Force Transition Trends,” (with Michael Seeborg), *Journal of Economics*, 1994.

### **SELECTED RECENT PRESENTATIONS**

- American Bar Association Section of Antitrust Law, “Nuts & Bolts of Presenting Economic Evidence to the Agencies: Common Pitfalls and Best Practices, Panelist, October 2019.
- Dechert LLP, 2019 Annual Antitrust Spring Seminar, Keynote Speaker, March 2019.
- Concurrences Review and The George Washington University Law School, 6<sup>th</sup> Bill Kovacic Antitrust Salon: Where is Antitrust Policy Going?, “A Judge’s Eye View on Antitrust: Mergers, Cartels, Remedies...,” Panelist, September 2018.
- Fordham Competition Law Institute, 45<sup>th</sup> Annual Conference on International Antitrust Law and Policy, “Merger Remedies,” Panelist, September 2018.
- Georgetown Center for Business and Public Policy, “Airline Competition Conference,” Panelist, July 2017.

J.P. Morgan Special Situations Investor Forum, “The Antitrust Merger Review Process,” Panelist, March 2017.

American Bar Association Section of Antitrust Law, “Economic Issues Raised In The Comcast – Time Warner Cable Merger,” Panelist, February 2016.

Fordham Competition Law Institute, 42<sup>nd</sup> Annual Conference on International Antitrust Law and Policy, “Antitrust in a Mobile World,” Panelist, October 2015.

American Bar Association Section of Antitrust Law, “Merger Practice Workshop,” Faculty Member, October 2015.

Searle Center Conference on Antitrust Economics and Competition Policy, Panel on Recent Transactions in the Telecom Industry, Panelist, September 2015.

National Bureau of Economic Research, Summer Institute 2015, Industrial Organization Meetings, “Panel Discussion of the Comcast-Time Warner Merger,” Panelist, July 2015.

Federal Communications Bar Association, “How the Antitrust Agencies and the FCC are Likely to Analyze Vertical Mergers,” Panelist, November 2014.

The Coca Cola Company Global Antitrust Forum, “Round Table Discussion on Use of Economics and Economists,” Panel Chair, November 2014.

Compass Lexecon Competition Policy Forum, Lake Como Italy, “Consolidation of the Telecoms Industry in the EU and the U.S.,” Panelist, October 2014.

The IATA Legal Symposium 2014, Aviation Law: Upfront and Center, “Merger Analysis – A sudden shift in approach by DOJ in the American Airlines and US Airways merger,” Panelist, February 2014.

Georgetown Law 7<sup>th</sup> Annual Global Antitrust Enforcement Symposium, “Merger Enforcement and Policy,” Panelist, September 2013.

American Bar Association Section of Antitrust Law, “Airline Mergers: First Class Results or Middle-Seat Misery?” Panelist, May 2013.

American Bar Association Section of Antitrust Law, “Go Low or Go Home! Monopsony a Problem?” Panelist, March 2012.

Federal Communications Bar Association Transactional Committee CLE Seminar, “The FCC’s Approach to Analyzing Vertical Mergers,” Panelist, October 2011.

The Technology Policy Institute Aspen Forum, “Watching the Future: The Economic Implications of Online Video,” Panelist, August 2011.

American Bar Association Forum on Air & Space Law, 2011 Update Conference, “Antitrust Issues: What’s on the Horizon for the Industry,” Panelist, February 2011.

American Bar Association Section of Antitrust Law, “Antitrust in the Airline Industry,” Panelist, September 2010.

## **GRANTS AND HONORS**

Searle Fund for Policy Research Grant, 2004-2006, for “An Empirical Examination of Asymmetric Information in Insurance Markets.”

Kellogg School of Management Chairs’ Core Course Teaching Award, 2003 & 2005.

Bradley Dissertation Fellowship, Stanford University, 1999-2000.

Stanford University, Outstanding Second Year Paper Prize, 1997.

## **ADVISORY, EDITORIAL, AND TRUSTEE BOARDS**

Global Competition Review, Editorial Board, Member

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## **REFeree FOR ACADEMIC JOURNALS**

American Economic Review

The Journal of Industrial Economics

The Rand Journal of Economics

Journal of the European Economic Association

The Review of Economic Studies

The Review of Economics and Statistics

Journal of Risk and Insurance