

304226

April 4, 2022

ENTERED
Office of Proceedings
April 4, 2022
Part of
Public Record

Surface Transportation Board
395 E Street SW
Washington, DC 20423

Docket No. EP 711 (Sub-No. 1)
Reciprocal Switching

Dear Chair Oberman and Members of the Surface Transportation Board:

Following my verified statement submitted to the Surface Transportation Board on February 14 (via the Association of American Railroads), please find attached additional analysis related to your proceedings on Reciprocal Switching.

Sincerely,

Robert Shapiro

Robert Shapiro

Reciprocal Switching and the Economics of the Freight Rail Industry

Robert Shapiro and Luke Stuttgen

April 4, 2022

SONECON 

Table of Contents

Executive Summary.....	3
I. Introduction.....	4
II. Background on Railroad Regulation	6
III. Revenue Adequacy as a Basis for Regulation.....	9
The Revenue Adequacy of Shippers and Other Industries.....	10
IV. New Competitive Challenges Facing Railroads	12
Technological Advances in Freight Trucking	13
Consolidation in Freight Trucking.....	14
Climate Change.....	15
V. The Impact of the Proposed Regulation on Investment	16
The Impact of Regulatory Uncertainty	17
The Impact of Lower Returns on Investments Related to Regulated Access.....	18
VI. Earnings and Revenue Flows	20
Ramsey Pricing	20
Impact of Regulation on Pricing Strategy	21
Access Pricing Considerations	22
VII. Consequences of Freight Rail Price Increases	24
Impact on Consumers and Small Businesses.....	24
Substitution with Other Forms of Freight Movement	25
Consequences of Substitution.....	26
VIII. Conclusions.....	28
References.....	30
About the Authors	37

Executive Summary

This study analyzed the economic effects of proposed regulations for mandated reciprocal switching, also called forced switching, by Class I railroads: We found that if the proposal is adopted by the Surface Transportation Board (STB), it would impair investment and service quality and raise costs and prices in the freight rail industry.

- Under the proposed, mandated reciprocal switching, the STB could force a railroad that is the only rail carrier serving a particular shipper facility to provide another railroad access to that shipper's freight. Under this approach, the first railroad would have to use its assets to assist a second railroad, and the second railroad would pay an access fee that almost certainly would be below the market rate.
 - The new rules would lower investment by creating uncertainties about the returns on equipment and facilities at single-served facilities and directly reduce revenues and therefore investments and expenditures for facilities subject to those rules.
- The new rules would harm consumers by impairing service quality at single-served locations and through higher prices for other services to offset the reduced revenues.
- Advocates justify these proposals by claiming that freight railroad revenues are more than "adequate," because the industry's returns exceed its cost of capital.
 - The freight rail industry achieved revenue adequacy only in the last decade, and in any given year in that decade, less than 60 percent of Class 1 railroads were deemed revenue adequate by the STB.
 - The new rules would impair this revenue adequacy by directly reducing revenues and would threaten long-run revenue adequacy by dampening investment.
 - Profitability is not a reasonable basis for regulating an industry's rates; and if it were, major shipper industries should pay more, not less, because their revenue adequacy far exceeds that of the most profitable Class 1 railroad.
- The new regulation would take effect in a period when Class 1 railroads need to increase their investments to meet the growing competition from freight trucking.
 - The trucking industry is reducing costs through mergers and acquisitions and by adopting new technologies, intensifying the competitive pressures on freight rail.
 - As climate change creates new investment requirements for transport systems, railroads will bear the costs to make their operations more resilient while taxpayers will fund highway, bridge, and other infrastructure costs for trucking.
- Mandating reciprocal switching at government-set rates is unnecessary as well as economically harmful. Railroads already engage today in voluntary switching when it makes economic sense for both parties to do so.

Reciprocal Switching and the Economics of the Freight Rail Industry

Robert Shapiro and Luke Stuttgen¹

I. Introduction

The decision by the Surface Transportation Board (STB) to consider new regulations for mandated reciprocal switching by Class I railroads raises significant issues about the basis for such mandated switching and its impact on railroad investment, service quality, costs, and prices.

Mandated reciprocal switching, also known as “forced switching,” occurs when a shipper served by one railroad for a complete end-to-end movement wants to use another railroad for part of that movement. In this circumstance, the first railroad or the “incumbent railroad” could be ordered by the STB to use its labor, track, and equipment to move the shipper’s freight to or from an interchange with a second railroad, where the traffic would be “switched” between the two railroads. The second railroad would pay the incumbent railroad a switching fee, which under mandated switching most likely would be set directly or indirectly by the STB at below-market rates.

Today, most rail customer facilities are directly served by just one railroad—that is, the facilities are “singly-served.” Such single-railroad service does not constitute a monopoly because rail customers, including those served by only one railroad, typically have access to other routes and transportation modes (especially trucks or barges), and other competitive forces also are often present.² Railroads commonly engage voluntarily in reciprocal switching by negotiating terms that satisfy both parties, where and when it makes economic sense to do so. But under mandated reciprocal switching, the goal is lower rates for singly-served shippers regardless of their ability to pay a market rate or use alternative routes or modes of transport. If adopted, the proposed regulation for mandatory reciprocal switching would pose a serious threat to sustainable investment by freight railroads and thereby impair the quality of rail freight infrastructure and service.

Since the Staggers Act of 1980 that partially deregulated the U.S. freight rail industry, freight railroads have made large, sustained investments to modernize their equipment, facilities, and operations, reviving the industry and thereby demonstrating the success of deregulation. The proposed regulation could unravel that success by discouraging future investments.

The regulation would depress investment as well as ongoing expenditures by creating uncertainties about their expected returns. Studies have shown that this effect first occurs when a government body considers new rules that could reduce an industry’s

¹ We gratefully acknowledge support for our research provided by the Association of American Railroads. The analysis and views are solely those of the authors.

² For example, a railroad delivering coal to a power producer may be constrained by potential competition from natural gas pipelines that could also generate the power.

revenues. Investors and other providers of capital respond by delaying their investments and demanding better terms, increasing the industry's cost of capital. This first-order uncertainty effect is sustained if the government body approves the proposed regulation, since uncertainties will persist around the rules to determine when and how to apply the regulation in individual cases.

If the proposed rule is adopted, investment particularly by Class I railroads would be further impaired by directly reducing their revenues, thereby lowering their rates of return on the equipment, facilities, and operations subject to the new rule.³ This effect is related directly to railroads' use of "Ramsey pricing," explicitly approved by the STB and its predecessor agency the Interstate Commerce Commission (ICC).

Ramsey pricing is simply market pricing: Prices offered by railroads vary by location based on how dependent a shipper is on the rail service and thus the shipper's willingness to pay to move its product. The connection to investment occurs when railroads estimate those prices before undertaking an investment, including those for singly-served facilities, to determine if they can recoup their capital and operating costs and earn adequate returns given the prices that other shippers pay across the railroads' networks. Forced switching would reduce those returns, reducing railroad companies' incentives to invest in expanding their infrastructure and in the upkeep and repair of existing assets. By artificially reducing those returns based on a government decision rather than market forces, the proposed regulation would affect service quality at regulated switching locations and thereby harm shippers as well as the American public.

A leading justification offered by proponents of new reciprocal switching regulation is railroad industry revenues are more than "adequate," defined in this context by the ratio or difference between a company's rate of return (ROI) and its industry's cost of capital (COC). However, this financial concept of revenue adequacy provides no sustainable basis for the proposal. The proposal would directly reduce revenues and the revenue adequacy of railroads affected by it. Moreover, the majority of Class I railroads achieved revenue adequacy only over the past decade, and less than 60 percent of those railroads have been deemed revenue adequate by the STB in any given year. This achievement was based on railroads' decades of sustained, high levels of investment; and perversely, the proposed regulation would discourage future investments that could raise revenues or reduce costs.

Further, the revenue adequacy of most shipper industries has far outpaced Class I railroads: The return on investment over the cost of capital by Class I railroads was about 34 percent in 2019 and about 42 percent in 2020, compared to 130 percent or more for major shipper industries. If revenue adequacy or profitability were a legitimate basis for

³ There currently are seven Class I railroads, classified as such because their annual revenues exceed \$900 million. They account for a large majority of U.S. freight railroad volumes and revenues.

regulation that would transfer funds to the less profitable party, shippers should be required to pay *more* for their rail freight services.

This new regulation would also occur at a time when railroads will have to increase their investments to maintain their profitability in the face of new competitive challenges from freight trucking. The trucking industry has entered a period of consolidation and widescale adoption of new technologies that will intensify competitive pressures on railroad revenues and their revenue adequacy. Climate change could further increase those pressures by imposing greater burdens on railroads than trucking, since railroads finance their own infrastructure while taxpayers pay the bills to build, maintain, and repair the roads, highways, and bridges that comprise most of the trucking industry's infrastructure. Rail transport is also safer and more environmentally responsible than trucking, so to the extent that forced switching regulation impairs freight rail in its competition with trucking, the consequences will include more transport-related deaths and injuries and more harm to the climate.

In these and other respects, the proposed regulation is unnecessary and potentially harmful. Railroad companies engage in voluntary switching today when it makes economic sense for both parties to do so. The proposed regulation would force railroads to engage in switching activities that make no economic sense for them and have no objective economic basis, and thereby impair their revenues, investment, and ongoing operations. These harms also could result in economic losses for workers, consumers, and U.S. businesses. We find no economic or other basis to justify such a policy in the face of these negative effects.

II. Background on Railroad Regulation

Railroads were the first American industry subject to comprehensive federal economic regulation, under the "Act to Regulate Commerce of 1887," and it lasted more than 90 years.⁴ By the 1970s, when Congress moved to deregulate airlines, trucking, natural gas, and banking, the failure of railroad regulation was obvious to the lawmakers as well as economists, investors, and customers. The industry suffered from excess capacity, high fixed costs, low investment, and inefficient equipment and infrastructure.⁵ Congress first stepped up in 1973 by taking over and reorganizing Penn Central and other bankrupt rail carriers in the Northeast. Three years later, Congress eased restrictions on some rates and on closing certain underused rail lines and provided federal loans and subsidies to some strapped carriers.⁶ This process culminated in the Staggers Act of 1980 that broadly deregulated most rail rates and allowed carriers to abandon unprofitable lines, cut other operations, negotiate short and long-term contracts, and merge with other carriers.

⁴ Gallamore and Meyer (2016).

⁵ Beard, Macher and Vickers (2016).

⁶ Braeutigam (1993).

This deregulation is credited widely with arresting the industry's decline and providing broad benefits to rail customers, railroads, and the overall economy. It allowed carriers to achieve substantial scale and network economies through mergers or consolidation and divesting unneeded trackage. The 18 Class I rail systems in 1980 have been combined to create the current seven Class I rail systems (accounting for changes to the Class I revenue requirement beyond an inflation adjustment).⁷ It also allowed them to charge customers different prices based on demand. In so doing, the market rather than the government determined rail prices and thereby revenues, and investment responded by expanding rapidly.

In 1990, the General Accounting Office—now called the Government Accountability Office (GAO)—found that the first decade of deregulation resulted in improved service and lower freight rates for most goods without sacrificing market share in intercity freight traffic.⁸ The GAO further found that the industry's rate of return on net investment had increased from 1.2 percent in 1975 to 6.7 percent in 1988, although rail industry revenue remained well below its cost of capital. Over time, however, the industry operating margins improved more than other deregulated industries and more than most non-regulated industries.⁹

Analysts also credit deregulation for the rapid adoption of freight rail offerings and the growth of piggybacking (truck trailers and shipping containers transported on flatbed rail cars), unit trains, and mechanized track maintenance.¹⁰ From 1980 to 1994, the process of closing unprofitable lines, mergers, and sustained investment also increased annual productivity gains from 0.1 percent to 0.9 percent. While industry employment contracted over this period, real compensation per-railroad worker jumped 43 percent.¹¹

The deregulation of freight rates included one significant exception: Shippers could appeal to the ICC and its successor agency the STB to overturn a rail carrier's rates if those rates exceeded 180 percent of the carrier's variable costs (i.e., excluding fixed costs) and if the carrier was "market dominant" and therefore not constrained by competition from other rail carriers or other modes of freight transport such as trucks and barges transporting the same type of goods in the same area.¹² The Staggers Act, therefore, protects market competition in freight rail transport services, and the rules now in place for more than 40 years reserve government-mandated rates for instances when a rail carrier can be shown to have market power and charged unreasonable rates.

Singly-served shippers have long called for government-regulated rates, but the economics of the freight rail industry has presented serious challenges to their case. The existence of such single-served stations reflects the capital intensity of the railroad industry: Its fixed costs for tracks, locomotives, switches, facilities, and more dominate its

⁷ Gallamore and Meyer (2016).

⁸ Government Accountability Office (1990).

⁹ Pinkowitz and Williamson (2016).

¹⁰ Hsing (1994).

¹¹ Davis and Wilson (2003).

¹² Braeutigam (1993).

total costs; and given a carrier's economies of scale, its fixed costs per-ton of freight decline as its volume increases. As a result, rail services in most places are supplied most economically by a single carrier.¹³ Given the cost structure of the freight industry it is often not economically viable for more than one railroad to serve a particular shipper.

Claims that single-access points create monopoly power for the railroads that control them are difficult to sustain, because shippers can generally avoid single-served locations by using other modes of transport such as trucking and barges or on the front end by locating facilities with access to multiple railroads. Economists further note that such determinations should also consider product and geographic competition. Experts in the economics of railroads also have long found that a rail carrier's variable costs—costs that vary with the output of a service—include substantial common costs assigned to the service. As a result, the 180 percent revenue-to-variable cost threshold to consider a rate complaint does not reliably measure the degree to which a carrier's rate in a particular location exceeds its actual incremental costs.¹⁴

Rate ceilings based on fully allocated costs also impair incentives for shippers to negotiate rates and contracts with rail carriers and therefore are "inimical to the public interest."¹⁵ The ICC acknowledged this problem as early as 1985, when it found that a meaningful maximum rate policy could not rely on a strictly cost-based approach.¹⁶

The STB has proposed a number of approaches to establish the threshold for excessive rates given these challenges. In the 1980s, the agency used a "Stand-Alone Costs" (SAC) methodology to determine the minimum cost for a hypothetical carrier to provide the service for the shipment in question. This methodology was generally sound, but shippers criticized it as impractical, since it requires estimating the cost to build the part of the network used to deliver the shipment and the revenues it could collect from using it to transport additional shipments. It remains the most widely supported methodology for large rate dispute cases.

The STB also introduced a "Three Benchmark" test to assess the revenues needed to operate a facility, but this approach reintroduced problematic variable cost measures. In any case, no shipper used it to challenge a single-source rate from 1996 to 2006. In 2007, the STB tried simplified versions of the stand-alone cost test and the Three Benchmark tests, followed by a test for market dominance based on calculating the highest price a carrier could charge without losing a significant amount of traffic and its ratio to the carrier's variable costs. The STB also tried simplified versions of stand-alone costs to determine the reasonableness of a particular rate is reasonable.¹⁷ Throughout this process, economists have found that no approach to assess the reasonableness of a price based on allocating a particular share of a carrier's fixed costs to a specific activity.¹⁸

¹³ Mayo and Willig (2019).

¹⁴ Mayo and Sappington (2016).

¹⁵ Baumol and Willig (1983).

¹⁶ Mayo and Sappington (2016) with reference to "Coal Guidelines."

¹⁷ Rate Reform Task Force (2019); see also Mayo and Willig (2019).

¹⁸ Mayo and Sappington (2016).

Moreover, any determination of excessive rates should recognize that demand differs from customer to customer, who respond differently to a range of prices and to market and general economic conditions.¹⁹

III. Revenue Adequacy as a Basis for Regulation

Advocates of new switching regulation often justify their proposals by citing railroad earnings as evidence of unreasonable pricing and the need for increased regulation. This position is economically unsound as well as plainly inaccurate.

Economists have long found that regulations based on the earnings of a company and industry create perverse incentives that in various ways produce unwanted results harming consumers as well as the company and industry. Such regulation erodes incentives to invest in new technologies and other innovations that can raise earnings or reduce costs, leaving the industry with less efficient technologies and operations that result in higher prices for consumers.²⁰ By limiting earnings in certain areas, such regulation also creates incentives to raise prices in unregulated areas. Regulation tied to earnings from certain activities can also create incentives to reduce ongoing investment and expenditures in those areas, harming consumers by degrading service quality.²¹ Since earnings change from year to year, a price-related policy keyed to earnings also can increase price volatility in both regulated and unregulated operations.

As the STB considers the proposed regulation, a snapshot of the rail industry's current financial status cannot provide sufficient grounds for new regulation that will directly affect its revenues going forward and alter the terms of competition. Rather, a serious evaluation of the financial condition of the railroad industry also should take account of the historical context and likely future developments in the transportation marketplace. To ensure that the rail industry earns adequate revenues over the long term, so its ROI equals or exceeds its COC over a long term, that ROI must be allowed to fluctuate above as well as below its COC. If regulation penalizes the industry for a ROI that moves above the COC, investments in freight rail will not be an attractive proposition, and investors will offer capital only at higher prices.

The ICC and STB have examined the revenue adequacy for each Class I railroad on an annual basis using a range of approaches. Under those methods, from passage of the Staggers Act in 1980 to 2003, Class I railroads were deemed to be revenue adequate less than seven percent of the time.²² From 2004 to 2012, an average of less than two of seven Class I railroads met this threshold in any given year (Figure 1 below). And from 2013 to 2019, an average of just over four of the seven Class I railroads were deemed revenue adequate in any given year.

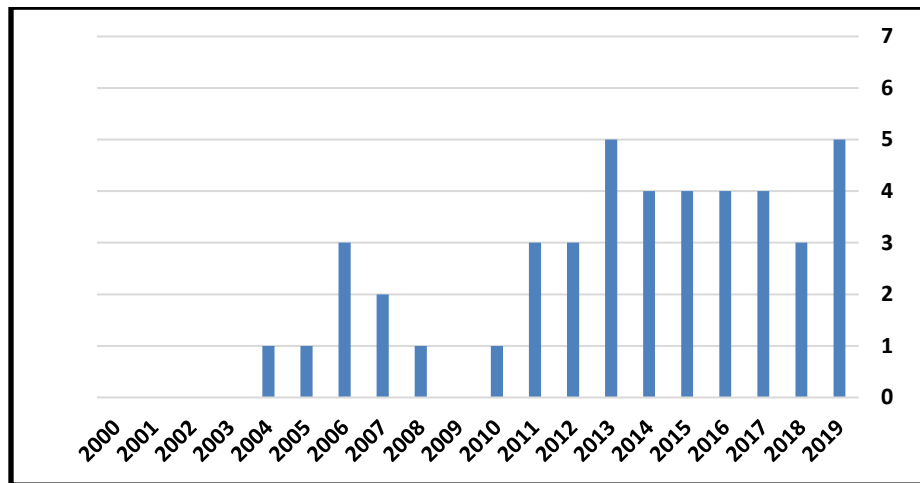
¹⁹ Mayo and Willig (2019).

²⁰ Mayo and Sappington (2016).

²¹ *Ibid.*; Trebing (1980).

²² Rosenberg and Strafford (2014).

Figure 1: Number of Class I Railroad Deemed Revenue Adequate, 2000–2019



The Staggers Act includes the explicit goal of ensuring that carriers generate adequate revenue to provide a “safe and efficient rail system,” and the industry’s progress towards revenue adequacy is evidence of the STB’s success implementing the Act and the success of the industry’s investments and operations. Congress reaffirmed these achievements when it reauthorized the STB in 2015.²³ The proposed rule change would put those improvements at risk.

The Revenue Adequacy of Shippers and Other Industries.

Advocates from shipper industries have asserted plainly that the rail freight industry’s revenue adequacy somehow justifies forced switching regulation.²⁴ When properly analyzed, revenue adequacy may be a reasonable measure of the industry’s economic condition; but so long as reasonable profits are an acceptable goal, revenue adequacy cannot provide a reasonable basis for regulation. Moreover, the advocates’ logic here is also self-defeating since the new regulation would dampen railroad returns on investment, increasing their cost of capital and thereby reducing revenue adequacy. And as we show below, applying the same standard to the shipper industries advocating the proposed change provides evidence against mandated switching as the revenue adequacy of most shipper industries far outpaces Class I railroads.

Figure 2, below, presents the median returns on invested capital minus the average cost of capital for Class I railroads and for major shipper industries from 2006 to 2018.²⁵ This analysis shows, first, how recently railroads’ ROI (as measured by the STB) exceeded their COC on an industry-wide basis—and that was only in some years, and only by narrow margins. The analysis also shows that while five of seven Class I railroads were revenue adequate under the STB’s annual measurement in 2020 with returns on invested

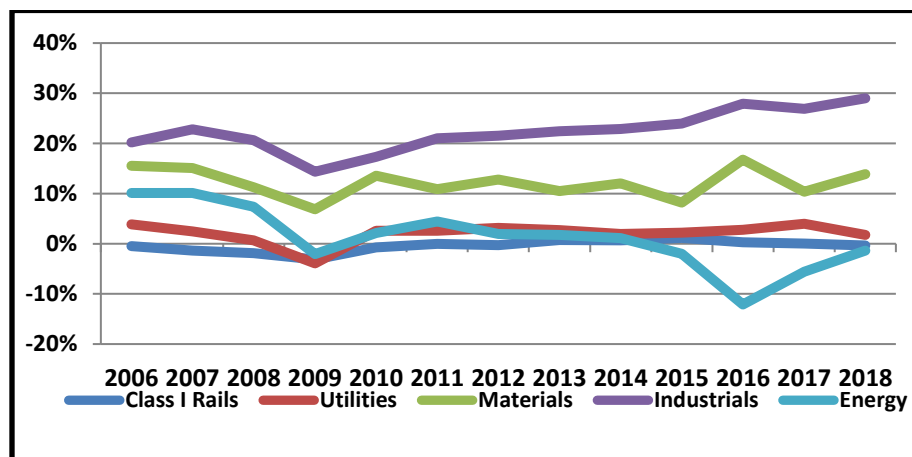
²³ P.L. 114-110, The Surface Transportation Board Reauthorization Act of 2015.

²⁴ Shipper Coalition for Railroad Competition (2017).

²⁵ Murphy and Zmijewski (2019).

capital of 7.20 percent to 14.44 percent, the revenue adequacy of the shipper industries consistently has been substantially greater, including private utilities whose rates are regulated by state agencies. The exception was the energy sector since 2015, a sector with very volatile revenues resulting from strong external shocks that depressed its revenue adequacy from 2012 to very recently.

Figure 2: Median ROI–COC for Five Major Sectors of the S&P 500, 2006–2018



In 2020, the average ROI of railroads weighted by revenues was 11.2 percent and their average cost of capital determined by the STB was 7.9 percent. The result was a return on investment of 42.3 percent above the cost of capital or barely 3 percentage points. However, the effects of the pandemic make 2020 a very non-standard year, and the results of the same calculations for 2019 results show a return on investment for Class I railroads of less than 30 percent above the cost of capital. By contrast, the return on investment of eight major shipper industries—aerospace and defense, electrical equipment, pharmaceuticals, biotech, air freight, and logistics, metals and mining, chemicals, and energy equipment services—was some 130 percent or more above their cost of capital.

Similarly, focusing on the median revenue adequacy of S&P 500 companies across nine sectors, Class I railroads, and the overall S&P 500 in 2016, 2017, and 2018 shows that by this metric, railroads were barely revenue adequate in two of the three years and revenue inadequate in the third year (Table 1 below). By this measure, Class I railroads trailed badly behind the overall S&P 500 and eight of its nine other sectors—again, excepting only energy. Overall, approximately 90 percent of firms in the S&P 500 were revenue adequate each year. Compared to the large private firms in most sectors, railroads have faced challenges in attracting investment, suggesting that the STB should reject any steps that would discourage private investment in railroads and consider instead measures that would encourage such investment.

Table 1: Median ROI–COC for 10 Sectors of the S&P 500, 2016, 2017 and 2018

Sector	2016	2017	2018
Communication Services	70.0%	63.5%	93.5%
Information Technology	56.9%	48.1%	58.6%
Health Care	47.4%	38.0%	49.2%
Consumer Staples	36.0%	37.1%	40.0%
Industrials	27.9%	26.9%	29.0%
S&P 500	21.9%	19.8%	28.6%
Consumer Discretionary	14.3%	11.1%	14.0%
Materials	16.8%	10.4%	13.9%
Utilities	2.8%	4.0%	1.8%
Class I Railroads	0.3%	0.01%	-0.3%
Energy	-12.1%	-5.6%	-1.4%

Even if railroads were currently achieving “adequate” revenues, this does not in itself support further regulations. Rather, it raises additional issues. First, is there a reasonable expectation of continued revenue adequacy? Second, if regulatory changes were enacted, what would be the effect on the services offered by the industry and how would it impact the economy? These questions are answered in the following sections. In section IV, we review several upcoming challenges for the rail industry that could threaten its current stint of revenue adequacy. Section V broadens this analysis by evaluating the effect of the proposed new rule on investment demand in the rail sector and therefore its revenue over a longer term. Finally, section VI analyzes the effect of the proposed rule on freight rail pricing in general, and section VII examines how those pricing changes would affect consumers and small businesses.

IV. New Competitive Challenges Facing Railroads

The case that the earnings of some Class I railroads justify the proposed rule change ignores the larger economic context of competition in freight transportation. In many markets and places, railroads compete directly with truck carriers, with trucks offering more flexibility and speed but higher prices than rail. Further, Bureau of Labor Statistics data show that from 2016 to 2021, prices for long-distance trucking increased about 47 percent compared to just over 20 percent for line-haul railroads.²⁶

Looking ahead, several developments are likely to favor trucking over railroads, including the positive effects on trucking industry costs from the downward trend of energy prices (notwithstanding the recent spike), recent technological developments, trucking industry consolidation, and challenges related to climate change. In the context of these developments, the proposed rule would further aggravate pressures on railroad

²⁶ American Association of Railroads (2022).

revenues, earnings, and investment. Any consideration of the proposed rule should not occur in a vacuum and should instead take account of these expected changes in the competitive landscape for freight rail.²⁷

Technological Advances in Freight Trucking

The trucking industry's two primary costs are fuel and labor. In 2011, those two factors accounted for about 70 percent of all industry costs; and since then, labor costs have remained relatively steady and energy costs have declined substantially.²⁸ In addition to declining oil and gas prices, larger fleets have improved the industry's bargaining power with its fuel suppliers, and advances in trucking technology have improved the fuel efficiency of newer trucks.²⁹ As a result, the average marginal fuel costs per-mile for trucking declined from an average of \$0.645 per-mile in 2012 and 2013 to \$0.385 per-mile from 2016 to 2019.³⁰ While recent international developments have led to higher fuel costs in the short term, the underlying trends are likely to continue over the long term.

In addition, trucking companies have begun to purchase the first generation of electric trucks with per-mile fuel costs about one-third less than conventional diesel fuel.³¹ While the initial costs of the new vehicles are still an obstacle to their broad adoption, projected improvements in battery and green-energy technologies should further reduce those costs, especially if Congress approves current proposals to subsidize the electrification of trucking fleets. Advances in self-driving or autonomous vehicles and technologies also could threaten freight rail's competitiveness with trucking, since more than 40 percent of trucking industry costs are labor-related. If self-driving trucks reduce the industry's labor costs over the next decade on top of trucking's declining fuel costs, the industry's enhanced competitive position could significantly impair the revenue adequacy of Class I railroads.

Other technological advances could further support trucking's competition with railroads, including the efficiency benefits from applying digitization and data analytics based on information from electric logging devices (ELDs).³² Digitization and new online and app-based software enable trucking companies to match truckers, carriers, and shippers much more efficiently, reducing industry overhead and logistics costs. These and other new management technologies also should help those carriers to better assess their fleets' needs and reduce losses associated with underutilizing their resources. As regulatory requirements for ELDs continue to phase in, trucking companies will gain

²⁷ Scribner (2022).

²⁸ American Transportation Research Institute (2020).

²⁹ *Ibid.*

³⁰ Kapadia (2021).

³¹ Hirsch (2020).

³² Kearney (2021).

greater control over their operations, further enhancing their competitiveness with freight rail.

Given these favorable technological developments for the trucking industry, railroads will have to substantially increase their investments in their networks and technologies to remain competitive.³³ In this context, the recent revenue adequacy of some railroads provides a foundation to help freight rail survive that the STB should not impair through new forced-switching regulation in the short term.

Consolidation in Freight Trucking

One factor supporting the economic viability of Class I railroads has been the industry's consolidation, a similar development may soon be seen in freight trucking and thereby also threaten freight rail revenues and investment. Much of the rail industry's productivity gains since passage of the Staggers Act have depended on increased economies of scope and scale, some of which arose from consolidation.³⁴ Consolidation, shedding of duplicative routes, and the provision of new services have enabled the industry to reduce its operational costs, improve quality, and take advantage of substantial network effects including larger track networks that reach more stations, the centralization of logistics, and other network efficiencies. Bitzan and Wilson (2007), for example, estimate that rail mergers and acquisitions from 1983 to 2003 reduced industry costs by 11.4 percent.³⁵ Over the same period, freight rail rates adjusted for inflation fell 43.2 percent.³⁶

With seven Class I railroads operating today, the potential for additional benefits from consolidation is limited, especially as compared to freight trucking. Trucking industry observers have noted a wave of large new acquisitions by major trucking firms since the mid-2010s.³⁷ This trend has accelerated during the pandemic, with numerous major acquisitions enabling large trucking companies to integrate vertically, reduce their fixed expenses, expand their fleets, and acquire new technologies.³⁸ Beyond those benefits, consolidation enables large trucking companies to reduce their numbers of required truckloads by increasing the volume of freight per trip. Consolidation also can help reduce their costs for fuel, wages, and logistics, decrease damages to freight in transit, and reduce trucking emissions and congestion at truck loading facilities.³⁹

The number of small trucking carriers—outfits with six or fewer trucks—also jumped by 69 percent from 2012 to 2018, according to the Federal Motor Carriers Safety Administration (FMCSA). Department of Transportation data suggest that the number of

³³ Cotey (2012).

³⁴ Agricultural Marketing Service (2014).

³⁵ Bitzan and Wilson (2007).

³⁶ Prater, Sparger and O'Neil, Jr. (2014).

³⁷ Miller (2018).

³⁸ Wolf (2020), Clevenger (2021), and Schulz (2021).

³⁹ Point-to-Point (2020).

independent truckers has increased further during the pandemic as demand for local deliveries of e-commerce and other online orders has risen and new software has lowered the cost of entering the trucking spot market.⁴⁰ While short-haul trucking complements freight rail, particularly for moving goods out of rail facilities, long-haul trucking is a competitor or substitute; and long-haul trucking companies have responded to these developments by acquiring smaller short-haul carriers and expanding their services to cover more varying lengths of transport.⁴¹

We should expect the trucking industry's continuing opportunities for consolidation, rationalization, and adoption of new technologies to enhance its competitiveness with freight rail by offering more vertically integrated services and lower overhead costs. Since comparable opportunities are less available for freight rail, these developments pose serious challenges for the industry to maintain its revenues and associated investment, without the additional burden of the proposed regulation.

Climate Change

The increased incidence of severe weather events associated with climate change also poses long-term competitive challenges for railroads as compared to trucking. First, the flexibility of trucking and the extensive networks of roads and highways give the trucking industry opportunities to avoid disruptive weather events on a per-trip basis that are unavailable to rail. Trucking companies also do not bear costs comparable to railroads for maintaining infrastructure that will be affected by climate change. As a result, climate change poses greater operational, strategic, and financial challenges for railroads in the two industries' competition.

Climate-related operational challenges for freight rail include increased track buckling from high temperatures as well as service disruptions from extreme weather events. Analysts using Monte Carlo simulations estimated the likely number of rail track buckling events in Spain under 15 climate scenarios.⁴² They found that under even relatively optimistic scenarios, rising temperatures may increase the incidence of track buckling by an order of magnitude, dictating the need for large railroad investments to enhance track resilience. Another study estimated that unless rail companies increase investments in sensor technologies and implementation, the temperature increases associated with climate change will also cause delays resulting in annual losses for the industry by 2100 ranging up to \$45 billion under a low emission scenario and up to \$60 billion under less favorable emissions conditions.⁴³ While estimates of the long-term impact of climate change on the freight industry vary, climate change poses serious challenges for railroad infrastructure that will require increased investment.

⁴⁰ Cassidy (2021).

⁴¹ Miller (2018).

⁴² Sanchis et al. (2020).

⁴³ Chinowsky, Helman, Gulati, Neumann and Martinish (2017).

There also is ample evidence that climate change is increasing the frequency and severity of weather events that disrupt freight service and dictate additional investments in climate-related resiliency and maintenance. Such disruptions will also include delays as well as the need for significant re-routings and halts in rail service.⁴⁴ While severe weather also can disrupt and delay truck transport, trucking companies have much greater ability to reroute their transports.⁴⁵ The logistics of freight rerouting in emergencies also are more straightforward for trucking than rail, since trucks can use other public roads while railroads have a limited range of tracks.

Climate change does pose substantial challenges for freight trucking, since extreme weather events that reduce road and highway resiliency increase the marginal cost of transporting freight by truck.⁴⁶ Improving the resilience of the nation's transport infrastructure to climate changes for both industries and repairing and maintaining that infrastructure following bouts of severe weather will require substantial investments. However, while railroads will bear the cost of those investments in tracks, switches, and facilities since they own their infrastructure, the freight trucking industry can rely on taxpayers to fund investments to strengthen, repair, and maintain the roads, highways, and bridges that comprise most of their infrastructure.

It is also notable that currently the trucking industry—and for the future, absent widespread electrification—has substantially higher greenhouse gas emissions per ton-mile than railroads. So, while railroads face the need to invest substantially in more fuel-efficient and climate-resilient equipment and infrastructure--consistent with the goals of the environmental, social, and corporate governance (ESG) movement--regulations that could weaken their competitive viability with trucking would be destructive environmentally as well as economically.

V. The Impact of the Proposed Regulation on Investment

The levels of investment in railroad infrastructure since 1980 are evidence of the success of the industry's deregulation and commerce in the United States—a success now threatened by the proposed reregulation. The Federal Railroad Administration reviewed World Bank data in 2013 and concluded that the U.S. freight railroad system was “the safest, most efficient and cost effective” in the world.⁴⁷ That achievement has been built on sustained efforts by railroad companies to raise their rates of return and attract the capital that has produced sustained, high level of private investment. From 1980 to 2020, railroads invested nearly \$740 billion, the equivalent of more than 40 percent of the industry's revenues, to build and maintain locomotives, tracks, tunnels, bridges, stations, switches, and other equipment and facilities.⁴⁸ Railroads continue to devote 18 percent

⁴⁴ Rossetti (2003).

⁴⁵ Ashe (2019).

⁴⁶ Meyer, Flood, Keller, Lennon, McVoy, and Dorney (2014).

⁴⁷ Stewart (2013). The references are cited in full in Exhibit B.

⁴⁸ Association of American Railroads (2021-B).

on average of their annual revenues to capital expenditures, compared to about 3 percent for the manufacturing sector.⁴⁹

The strong investment record of Class I railroads has enabled the industry to upgrade operations and technologies in ways that have promoted lower costs and prices. Analysts found that investments in new equipment, facilities, and operations from 1983 to 1997 enabled railroads to reduce their costs by 25 percent to 30 percent.⁵⁰ This record and continued high investment levels since 1997 rest on the incentives and the discretion over rates that the industry gained under deregulation. Before the Railroad Revitalization and Regulatory Reform Act of 1976 and the Staggers Act in 1980, the ROI for investors in the railroad industry was 1.2 percent, returns that could not cover the cost of capital.⁵¹ Regulatory reform and the investments that followed produced much higher returns, ranging most recently from 7.2 percent to 14.4 percent for Class I railroads in 2020.

The proposed rule would seriously dampen railroad investment going forward in four distinct ways. First, the prospects of reregulation and the process of determining when and how to apply the new regulation will increase uncertainty about the returns on investments in the equipment and facilities that could be affected by adverse rulings under the regulation. Second, every adverse ruling would directly reduce the return on investments in equipment, facilities, and operations subject to the mandated access under the regulation, reducing incentives to invest in those affected factors. Third, the reduction in revenues resulting from mandated rates under the regulation would reduce funds available for investment, raising the industry's cost of capital and lowering its returns on investment. Finally, given the current regulation of freight rail and possible policy changes by various agencies and the Congress, forced switching could create momentum for additional interventions that could further deter investment.

The Impact of Regulatory Uncertainty

Uncertainty discourages investors by increasing the risks to their expected returns, and the proposed regulation introduces uncertainties in several ways that would reduce overall railroad investment.

While the new rules for forced switching at single-service locations are under consideration, investors cannot know how that process will affect the revenues and returns of railroad companies. Extensive economic studies have shown that under such circumstances, investors delay their decisions, demand better terms, or shift investments to companies whose expected rates of return can be estimated more reliably.⁵² As a result, this aspect of uncertainty increases the railroad industry's cost of capital and thereby dampens investment.

⁴⁹ *Ibid.*; U.S. Census Bureau (2021).

⁵⁰ Bitzan and Keeler (2003).

⁵¹ General Accounting Office (1990).

⁵² Hassett and Shapiro (2015).

Further, if the STB approves the new forced switching regulation, uncertainty about the precise rules for determining when it will be applied will persist for a considerable period, extending the adverse impact of uncertainty on the cost of capital and associated investment. In addition, once those rules are issued, the new process will introduce ongoing uncertainties about how the rules will be applied case by case and the level of the mandated rates for transport through particular single-service locations, again case by case. These uncertainties will produce continuing upward pressure on the cost of capital for Class I railroads and consequently ongoing downward pressure on investment.

Potential investors in Class I railroads also may be discouraged by the STB's willingness to proceed with regulation merely because some Class I railroads have reached acceptable levels of revenue adequacy. A majority of Class I railroads began to earn their cost of capital (based on STB findings) only in the past decade, following three decades of modernization, consolidation, and sustained high levels of investment. Further, revenue adequacy in one year is far from an indication of a carrier's long-term financial health or a guarantee of revenue adequacy in the following year; and in any given year from 2011 to 2019, only half of Class I railroads were found to be revenue adequate. In this context, a decision by the STB to allow rail revenues to fall by imposing forced switching could impair investors' confidence that going forward, railroads will be able to maintain revenue adequacy and generate profits that justify continued investment under the new rules.

The Impact of Lower Returns on Investments Related to Regulated Access

The proposed rule also would directly reduce investment by depressing the returns on the equipment, facilities, and operations subject to forced or mandated access. Unlike its competitors in the freight trucking industry, railroads pay for their own infrastructure—much like the networks of telecommunications companies. When a railroad considers expanding or upgrading its network—for example, by building new track, switches, and facilities for currently underserved locations—it determines whether the expected revenues from the new investments will exceed its substantial fixed costs and capital costs plus additional variable costs for activities such as maintaining tracks and servicing and operating locomotives. These generally are long-term investments undertaken for horizons of 25 years or more. The prices that so-called “captive shippers” pay to access the railroad network are higher, because railroads have to recoup their costs to build and maintain the facilities that service that shipper's modest numbers of carloads.⁵³ As in any market, the pricing is based ultimately on what shippers are willing to pay. As noted earlier, shippers often have access to other modes of transport, and product and geographic competition also can affect these market conditions.

⁵³ Generally, more than one railroad will serve a particular location when capital markets—investors and lenders—determine that there is sufficient volume to support more than one railroad.

The prices that prospective shippers are prepared to pay for such access reflect their “elasticity of demand.” Economists call this “Ramsey pricing,” and the STB and the ICC before it supported its use since 1985.⁵⁴ Before undertaking substantial capital expenditures, railroads estimate what existing shippers will be willing to pay and what additional traffic might be generated, based on the railroad’s experience, market research, and negotiations. In this way, railroads can better assess the potential revenues from the investments and compare those revenues to the up-front capital costs and long-term maintenance costs in order to estimate how long it will take for the investment to generate returns that justify the capital expenditure.

Forced switching regulation would directly reduce those revenues by mandating lower prices for shippers using facilities served by one railroad, which explains why shipper organizations have pressed for this reregulation. However, such savings by shippers might not be permanent, because railroads that cannot rely on recouping the costs of those investments have no incentive to build and maintain such facilities. The proposed regulation also would discourage railroads from building into an existing facility since a railroad would be able to use its competitors’ tracks. Moreover, the regulation would impair the overall ROI of railroads over time, eroding the incentives and capacity of railroads to expand their networks and improve their infrastructure and at a time when overall demand for freight transportation is likely to grow by as much as 50 percent by 2050 according to the Bureau of Transportation Statistics.⁵⁵

The extent of the likely damage from this rate reregulation will depend on the access-pricing regime and adjudicating process adopted. The recent history of price regulation—including the serious ongoing problems that economists and the STB face trying to determine market dominance and maximum reasonable rate—provides no grounds for confidence that new pricing rules by regulators will account for the nuanced permutations of railroad pricing and their allocations of fixed and variable costs. We examined this issue further in Section II, above, and in Section VI below.

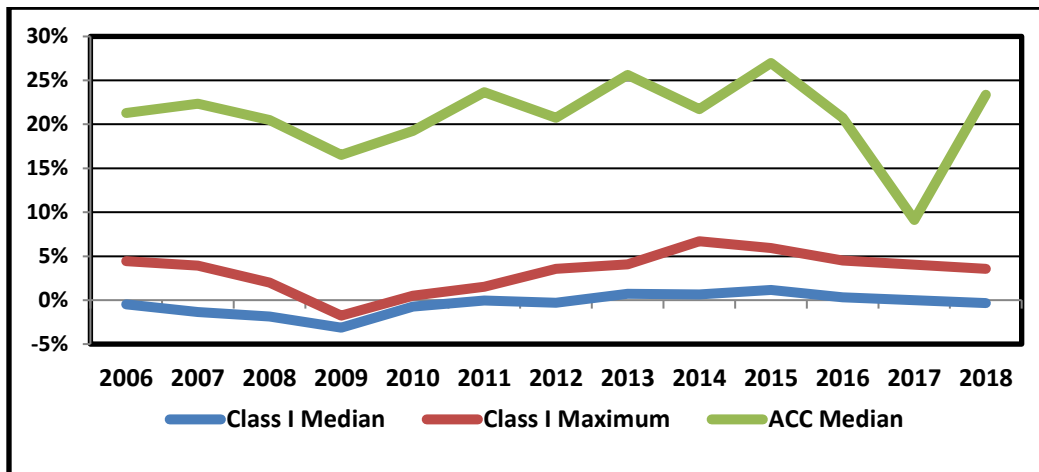
Finally, by shifting revenues from rail companies to shippers, the proposed regulation would also impair employment since railroad investments and revenues generally create more jobs than the investments and revenues of shipper industries. The American Chemistry Council (ACC), for example, is a shipper group advocating the proposed rules.⁵⁶ ACC companies are not only more revenue adequate than the Class I railroads with the highest current returns—their median revenue adequacy exceeded the maximum annual revenue adequacy achieved by any Class I railroad by 15 to 20 percentage points every year except 2017 (Figure 3 below). New rules that would shift revenues from railroads to shippers also could impair job creation and incomes and reduce union employment. Notably, organized labor in the rail; industry opposed forced switching proposals in 2016 and again in 2022.

⁵⁴ McCullough (2015).

⁵⁵ Bureau of Transportation Statistics (2021-B).

⁵⁶ Pociask and Sigaud (2021).

Figure 3: Revenue Adequacy of Railroads vs. ACC Companies, 2006–2018



VI. Earnings and Revenue Flows

The increased profits for shippers under the proposed regulation would not only come at the cost of railroad companies and their employees; mandated reciprocal switching also would harm the interests of consumers and taxpayers nationwide. To determine these effects of the reregulation, it is necessary to fully understand the existing pricing structure for freight rail.

Ramsey Pricing

Given the significant economies of scope and scale in the freight rail market, the prices charged by the rail companies are not determined simply by their marginal costs of providing their services. Instead, railroads use Ramsey pricing strategies (also known as differential pricing) to maintain financial viability while minimizing overall costs to consumers. Under these pricing strategies, the more value a route provides to a shipper, the higher the rate they are charged. In this way, the revenues that a railroad receives are equitably distributed among their customers, at least to the extent that the railroad company can ascertain a shipper's marginal elasticity of demand.

Given that a primary complaint from self-styled "captive" shippers in support of mandated reciprocal switching is that those shippers serviced at certain points by only one railroad pay higher prices than those who are serviced by multiple shippers, they apparently take issue with this pricing model. However, whenever these shippers pay a higher price for rail services rather than use available alternatives, they demonstrate their revealed preference—that is, they value the rail services sufficiently to warrant the price. Ramsey prices in freight rail markets are based on shippers' marginal elasticity of demand through their revealed preferences: The lower the marginal elasticity, the higher the price of the services. And by charging different prices to different customers based on how valuable each service is for each customer, rail companies maximize social welfare by

allowing them to operate routes that otherwise would be priced below marginal costs and thus would be unsustainable. As a result, the current system expands the number of customers it can serve by allocating revenues across the network.

Ramsey pricing and other differential pricing approaches are common across many industries. One common example is age-related discounting. Restaurants and other family-oriented leisure activities often offer discounts for young children and senior citizens. This pricing strategy enables large families, who tend to have a higher costs-to-earnings ratio and therefore higher elasticity of demand, to engage in more commercial leisure options. It also allows businesses to access a segment of the consumer base that otherwise would be priced out of the market. Therefore, it increases both producer and consumer surplus.

Similarly, movie theaters, buffets, and other capacity-constrained businesses often charge higher prices at peak times, which allows them to offset or recoup losses from operating their businesses during slower time periods. In much the same way, the higher prices that freight railroads charge for routes that are demand inelastic allow them to recoup or offset joint and common costs from servicing competitive traffic that is more demand elastic. The same dynamics and potential to improve aggregate welfare underlies proposal for congestion pricing on toll roads, another form of Ramsey pricing.⁵⁷ Other examples of differential pricing include bulk discounts, loyalty programs, and purchase rebates. Differential pricing is clearly both common and economically beneficial. Its use for freight shipments is no more a sign of undue market power by railroads than Golden Corral charging higher prices on Saturdays suggests that they have monopoly power in casual dining.

Impact of Regulation on Pricing Strategy

The theoretical basis for the welfare gains of Ramsey pricing is well-developed in the economics literature of the last century, so we turn next to analysis of how the changes in rail prices that would follow the proposed regulation would harm consumers and taxpayers nationwide. The regulation would not eliminate the ability of railroads to set prices for different customers, but it would reduce substantially its efficiency and effectiveness. The principle that railroad companies have control over the cars using their tracks is an important factor in the welfare gains under this pricing approach. Railroads pay the costs to lay and maintain their tracks, so if a competitor can use those tracks at prices below what they would charge under Ramsey pricing, it would not only diminish their incentive for infrastructure investment; it also would induce them to raise prices on other routes to offset the losses from the forced switching.

The proposed rule also would adversely affect revenues across the railroad industry, directly reducing the incentives for investment and the associated quality of

⁵⁷ Anas (2020).

service. In 2022 testimony to the STB, multiple railroads noted that switches add roughly 24 to 48 hours in delays.⁵⁸ More generally, the congestion and inefficient use of resources that would likely result from forced switching at lower prices also would slow railroad operations, eroding profits and the industry's ability to compete with freight trucking. These effects could lead to higher prices for shippers that require expedited transport. While the precise extent of the efficiency losses and higher prices cannot be determined beforehand, forced switching clearly would tend to increase costs and reduce service quality.

There also is no basis for claims by some advocates that mandating reciprocal switching would increase rail utilization as compared to its competitors. Railroad companies engage in voluntary switching activities when it makes economic sense for them to do so and forced switching would only mandate unprofitable operations. Rail carriers are currently profitable may be able to absorb such losses without raising other prices, although that would not be sustainable over a longer term. But their lower profits would still impair investment and so erode future productivity gains, which in turn could lead to higher prices over a longer term. We should expect that over time, forced switching will increase the use of routes rendered unprofitable by the regulation, and the adverse effects on revenues and investment ultimately will result in less rail utilization and higher prices.

Access Pricing Considerations

Today, the value of reciprocal switching is determined by free negotiations between carriers and market forces determine the correct price of access to another railroad's lines. Any regulation that forces access to a competitor's rail systems would need a price-setting mechanism in the form of a prescribed rate, a rate limit, or an arbitration process. This mechanism is a necessary factor for any rigorous economic analysis of the effects of the proposed rule change.

Currently, shippers can appeal to the STB when they believe that the rates for rail services are unreasonable. This process can involve significant costs for the shipper in pursuing the complaint and paying the rate set by the railroad until the complaint is resolved. Purportedly in response, shippers have advanced proposals that would presume the rail carrier's market dominance under a broad range of conditions and require that rail companies prove that they are not exercising market dominance and charging unfair rates.⁵⁹ But shifting the railroad's presumption of innocence to a presumption of guilt not only does not reduce the costs of pursuing a complaint; it ignores the shipper's intermodal and routing-change alternatives and the constraining effects of indirect competition on rail rates. Moreover, industry experts have provided recommendations to alleviate those costs by streamlining the arbitration process, as comments to the STB in response to a

⁵⁸ Stephens (2022).

⁵⁹ Ibach (2019).

petition by several railroads.⁶⁰ While the details of how such streamlining could occur is outside the scope of this study, analysis of the costs of other proposed solutions suggest that it is a better route than forced switching. The system in place already produces economically efficient outcomes. The process can likely be refined to achieve higher levels of efficiency for all parties without the wide-ranging costs of imposing mandated prices.

As noted by Mayo and Willig (2018), there is no economic basis for a regulatory body to set “reasonable rate benchmarks” in the freight rail market based on allocating fixed costs. As noted earlier, a clear consensus of the economic literature since the deregulation in the 1980s is that trying to allocate fixed, joint, and common costs to determine rail carrier reimbursement rather than allowing rates to be set by shipper demand is very inefficient economically.⁶¹ Regulatory proposals that direct the STB to use such a system ignore the realities of the freight rail market and the consensus of economists.

Thus far, none of the shipper-advocated proposals have approached regulating rates in the freight rail market in economically-sound ways.⁶² One example is a proposal endorsed by the U.S. Department of Agriculture (USDA) that would determine market dominance based on revenues divided by variable costs (R/VC) and presume that a railroad’s rate is unreasonable if its R/VC value exceeds a level to be prescribed by the STB.⁶³ This proposal and others that use R/VC values to set a price ceiling or prescribe rates base the calculations on the “Uniform Rail Costing System” (URCS).

However, URCS requires that all variable costs be tied to individual shipments when most variable costs for railroad operations are shared or joint costs not connected as such to individual shipments in an economically meaningful way.⁶⁴ This approach would produce unreasonable conclusions such as a “finding” that one-quarter of rail traffic is priced below its variable cost. USDA has acknowledged flaws in the variable cost allocation using URCS but nevertheless support its use apparently because it is available. One commenter has noted that “this argument is equivalent to arguing that a driver should look for lost car keys under a streetlight instead of where he dropped them because the light is brighter there.”⁶⁵

⁶⁰ See, for example, Ellig (2019).

⁶¹ See, for example, Braeutigam (1980), Baumol and Willing (1982), Davidoff and Hermalin (2004), and Mayo and Sappington (2016).

⁶² New analysis using a broader waybill dataset might enable researchers to propose approaches that would account more accurately for intramodal competition in those calculations, but those data are not publicly available.

⁶³ Ibach (2019).

⁶⁴ Schmalensee et al. (2015).

⁶⁵ Ellig (2020).

VII. Consequences of Freight Rail Price Increases

Impact on Consumers and Small Businesses

As noted, proposals that could force railroads to charge less at singly-served locations could lead to higher prices for other routes, which in turn would tend to raise the costs of the affected transported goods. Higher prices on other routes could also induce some shippers to shift to alternatives, further raising prices for shippers who cannot or choose not to do so.⁶⁶ Moreover, consumers are unlikely to benefit from the mandated lower costs for shippers using those single-served facilities. Numerous studies have established that cost pass-throughs in most markets are asymmetric, with prices responding more strongly and quickly to cost increases than to cost reductions.⁶⁷ As a result, the proposed regulation would lead to higher prices for consumers and higher profits for large companies that already generate more than “adequate” revenues, especially compared to railroads subject to the regulation.

This upward pressure on consumer prices would occur while Americans are struggling to recover from the unprecedented pandemic downturn and already face the highest inflation since the 1980s. According to Gallup polling at the end of 2021, nearly half of Americans said that the current inflation was causing financial hardship.⁶⁸ The salience of the issue is also acute among small business owners: 22 percent called inflation the single most important problem in December 2021,⁶⁹ the highest level since 1980 and displacing the labor costs and quality as their chief concern.⁷⁰ As the proposed rule produces higher shipping costs overall that are passed through to consumers and small businesses, the financial hardships for many Americans and pressures on small businesses will increase.

Furthermore, consumers would be expected to respond asymmetrically to the price increases and reductions associated with forced switching, much as producers will tend to pass-through additional costs more than new savings.⁷¹ Consumers’ demand declines in response to a price increase to a greater degree than their demand increases in response to a price reduction. As a result, the new regulation also would tend to dampen overall demand for goods shipped by freight railroads and therefore overall demand for freight rail transport, because the increase in demand for goods shipped at prices reduced by forced switching would be insufficient to offset the reduction for goods shipped through other routes at higher prices.

⁶⁶ The alternative—railroads responding by lowering costs through hiring fewer people, buying less new equipment, or reducing maintenance—would be unsustainable, since it would reduce their efficiency.

⁶⁷ Ritz (2015).

⁶⁸ Younis (2021).

⁶⁹ Brennan (2021).

⁷⁰ Dunkelberg and Wade (2021).

⁷¹ Bonnet and Villas-Boas (2016).

Substitution with Other Forms of Freight Movement

If the proposed switching regulation results in increases in some freight rail prices and delays, some shippers may turn to alternatives such as trucking and barges. This substitution response would not ameliorate the full impact of higher prices for consumers and small businesses, since shippers already would have used trucks and barges if their prices, convenience, and quality had justified it. It is possible to estimate the extent to which shippers would engage in such substitution. The most comprehensive recent study of this issue looked at both own-price and cross-price elasticities of demand for trucking and rail freight transport of various goods from 1997 to 2007.⁷² That study found that the railroads' own-price elasticity averaged -1.639 (simple average), varying from -4.062 for wood products to -0.509 for chemicals. This means that for a one percent price increase in rail transport services, the volume transported would be expected to decline 1.639 percent. The railroads' own-price elasticity of less than -1.0 suggests that the freight rail market is relatively elastic and that shippers are price sensitive or inclined to substitute in response to higher prices.

The study also analyzed the "cross-price elasticity" between rail and trucks, or the percent increase in trucking volume expected when rail prices increase one percent. The results for major industries averaged 0.848 and ranged from 0.459 for transportation equipment to 1.357 for wood products.⁷³ This suggests that demand for rail transport is relatively inelastic for transportation equipment—higher rail freight prices will result in modest shifts from rail to trucking—and very elastic for wood product producers. It is unsurprising that the cross-price elasticity is less than own-price elasticity because shippers facing higher rail transport prices have options other than shifting the same volume of goods to truck transport, such as decreasing their shipping volumes or using other modes of freight transport.

Nevertheless, the elasticity findings suggest that the majority of the decline in rail freight use as a result of increased prices and reduced reliability would shift to trucking, which is reasonable given that roads are more easily accessible for shippers than waterways, airports, or pipelines. This result can be illustrated by applying the own-price and cross-price elasticities to Bureau of Transportation Statistics (BTS) data on annual ton-miles of freight by transport type in 2018.⁷⁴ In that year, BTS reports that over 70 percent of all freight movements involved rail, with 1.73 trillion ton-miles, and trucking with 2.03 trillion ton-miles. If rail transport increased its prices overall by 1.0 percent, the simple average own-price elasticity of demand of 1.639 suggests that freight transported by rail would decline by 28.4 billion ton-miles, while the simple average cross-price elasticity of 0.848 indicates that freight transported by trucks would increase by 17.2 billion ton-miles. This suggests that about 60 percent of the decline in rail freight arising from raising rail transport prices by 1.0 percent to offset losses from mandated switching would be

⁷² McCullough (2013).

⁷³ *Ibid.*

⁷⁴ Bureau of Transportation Statistics (2022).

captured by trucking, with the remaining 40 percent likely divided between water and pipelines, and reductions in total freight volume.

Consequences of Substitution

Such greater reliance on trucking also would entail new costs for the economy through additional roadway accidents and increased traffic congestion. According to the Insurance Institute for Highway Safety (IIHS), large trucks account for about 11 percent of all motor vehicle traffic deaths and 9 percent of all vehicle-miles traveled.⁷⁵ Accidents involving large trucks are disproportionately likely to result in fatalities due to the large discrepancies in size, height, and weight between large trucks and passenger vehicles, as well as truck driver fatigue and the braking capabilities of large trucks.⁷⁶ Even with advances in truck technology, fatalities are rising. The Federal Motor Carrier Safety Administration (FMCSA) reports that from 2009 to 2019, fatal crashes per-mile involving large trucks increased 47 percent and crash-related injuries per-mile involving large trucks more than doubled.⁷⁷ Over the same period, fatal crashes involving passenger vehicles per-mile declined and passenger-vehicle crashes involving injuries increased only 8 percent, suggesting that the trend of increased accidents involving fatalities and injuries is specific to trucking. This is very concerning since increases in e-commerce sales and deliveries will require greater use of freight trucks, especially in urban areas.⁷⁸

FMCSA also has estimated that accidents involving large trucks cost on average more than \$130,000 (\$2022) for towaway incidents, nearly \$300,000 for accidents involving injuries, and more than \$5 million for those involving a fatality. Using these data and the average cross-price elasticity of 0.848, we can estimate the economic costs of accidents arising from increased use of trucking in response to rail freight price changes due to the proposed mandated switching regulation. Based on these data, each 1.0 percent increase in freight rail prices associated with mandated switching regulation would increase the economic damage from roadway accidents involving trucks by \$408 million per-year, apart from the human costs of increased injuries and deaths.

Table 2 provides a breakdown by type of crash based on FMCSA's 2019 crashes involving trucks with a gross vehicle weight of above 26,000 pounds, a class of truck that could reasonably transport many goods carried by railroads. To be sure, this estimate is a rough approximation. Some of the large truck crashes reported by FMCSA for 2019 did not involve freight carriers; at the same time, those data do not include all types of crashes and costs. Moreover, crashes involving large trucks have increased steadily over time, and the increased congestion arising from shippers substituting trucking for rail would be expected to further increase accidents. After considering all of these factors, regulation that increases prices for freight rail by even a modest amount are likely to

⁷⁵ IIHS (2021).

⁷⁶ Insurance Institute for Highway Safety (2021).

⁷⁷ Federal Motor Carrier Safety Administration (2021).

⁷⁸ McDonald, Yuan, and Naumann (2019).

produce substantial additional economic and human losses from increases in trucking accidents.

Table 2: Marginal Economic Harm of Increased Rail Price by Type of Accident (\$ 2022)

Crash Type	2019 Baseline	Per 1% Increase in Freight Rail Prices	
		Increased Incidence	Cost
Towaway Crashes	85,219	723	\$104 Million
Injury Crashes	45,470	386	\$122 Million
Fatal Crashes	3,767	32	\$182 Million
Total	134,456	1,140	\$408 Million

In addition to these costs, greater use of freight trucking in response to mandated rates for single-source rail access also would entail increased costs for American taxpayers through higher spending to maintain roadways and raise greenhouse gas emissions. One 18,000 pound axle of a typical freight truck causes more damage to roadways than 5,000 cars for the same trip.⁷⁹ A 2010 analysis by the North Carolina Department of Transportation estimated that heavy trucks cost taxpayers an additional \$78 million per-year just for road maintenance.⁸⁰

Similarly, a study of freight traffic in Kansas found that highway damage totaled approximately two cents per-truck per-mile.⁸¹ Applying Bureau of Transportation Statistics data of approximately 177 billion miles of truck traffic in 2020⁸² and the cross-price elasticity of substitution, we find that a 1.0 percent increase in freight rail prices would lead to about \$300 million in additional highway damage per year. Average Americans would bear these costs in higher taxes and lower-quality road travel.

These substitutions also would entail significant energy and environmental costs. According to the Environmental Protection Agency (EPA), rail is 1.5 to five times as energy efficient as trucks.⁸³ The average operations of Class I railroads produce 22 grams of CO₂ per ton-mile compared to 65 grams for freight trucks. This means that the expected 17.2 billion increase in trucking ton-miles from a 1.0 percent increase in rail pricing would result in an annual increase of 740 million kilograms of CO₂ or about 1.6 billion pounds per-year compared to moving the same tonnage by freight rail. Forced switching would also increase emissions directly, because the time and coordination required for a forced switch would increase total idling time, resulting additional avoidable CO₂ emissions.

⁷⁹ Harrison (2022).

⁸⁰ Harney (2010).

⁸¹ Bai et al. (2010).

⁸² Bureau of Transportation Statistics (2021).

⁸³ Environmental Protection Agency (2019).

Finally, the substitution of trucking for freight previously transported by rail would entail significant costs for many workers' incomes. In 2018, 81 percent of railroad employees were union members,⁸⁴ compared to 17 percent of truckers in 2017.⁸⁵ Further, the Bureau of Economic Analysis reports that the wage and salary income of full-time employees in the railroad industry averaged \$114,672 in 2020, compared to \$60,585 in trucking.⁸⁶ Mandating reciprocal switching would reduce the market share, revenues and total paid compensation of a productive industry and hand over additional revenues and market share to other industries that pay their employees less and actively resist collective bargaining.

VIII. Conclusions

This study has found that the proposed new rules for forced switching lack sound economic basis and would entail substantial economic harm. Such regulation would use the government's authority to shift revenues away from the freight rail industry that provides part of the economy's basic infrastructure to producers of a wide range of goods that use that infrastructure to ship those goods. The case for this new regulation offered by its proponents includes no findings that the current arrangements for reciprocal switching involve market failure, anti-competitive behavior, or harm to consumers or workers. The public record also shows limited support for such market intervention. Therefore, their case has no apparent economic merit.

Following decades of investment and modernization made possible by deregulation, the U.S. freight rail industry is now widely judged to be the most efficient in the world. The proposed new rules for forced switching would impair that achievement by penalizing railroads that invest at much higher rates and pay much higher compensation than the shipper industries advocating the change. The proposed regulation would discourage continued strong investment by Class I railroads by reducing their revenues, depressing their returns on the equipment and facilities subject to the new rules, and introducing serious uncertainties for investors about railroads' future rates of return. The result would be less investment and, as a result, less efficient rail networks, declining service, and ultimately higher prices for consumers.

Advocates of the proposed change claim that the government can reasonably direct railroads to charge shippers less for access to single-service locations because railroads have adequate revenues as measured by returns on their investments that exceed their cost of capital. By this criterion, price regulation would be reasonable for any successful company that provides unique services—including most shipper industries, based on revenue adequacy that far exceeds any Class I railroad. The new rules would

⁸⁴ Stern (2020).

⁸⁵ Burks and Monaco (2019).

⁸⁶ Bureau of Economic Analysis (2021).

only widen this disparity in revenue adequacy by shifting revenues from freight rail to shippers.

The proposed regulation would also threaten the revenue adequacy of the freight rail industry by reducing its ability to undertake future investments that will be required to compete with freight trucking. In coming years, the trucking industry's competitive position compared to freight rail is likely to improve substantially based on its adoption of new technologies, opportunities for greater consolidation, and advantages in responding to climate change.

We conclude that the proposed regulation would degrade the country's transport infrastructure and harm American consumers by significantly impairing the future revenues and investments of U.S. freight rail companies.

References

- Agricultural Market Service (2014). "Railroad Concentration, Market Shares, and Rates." U.S. Department of Agriculture. February 2014.
<https://www.ams.usda.gov/sites/default/files/media/Railroad%20Concentration%2C%20Market%20Shares%2C%20and%20Rates.pdf>.
- American Transportation Research Institute (2020). "An Analysis of the Operational Costs of Trucking: 2020 Update." November 2020. <https://truckingresearch.org/wp-content/uploads/2020/11/ATRI-Operational-Costs-of-Trucking-2020.pdf>.
- Anas, Alex (2020). "The cost of congestion and the benefits of congestion pricing: A general equilibrium analysis." *Transportation Research Part B: Methodological*. Vol 136, June 2020.
<https://www.sciencedirect.com/science/article/abs/pii/S0191261519305132>
- Ash, Ari (2019). "Softening US truck market resets battle for domestic freight." *Journal of Commerce* online. Truckload Freight. May 8, 2019.
https://www.joc.com/trucking-logistics/truckload-freight/softening-us-truck-market-resets-battle-domestic-freight_20190508.html.
- Association of American Railroads (2021-A). "Railroad Jobs: A Highly Skilled & Compensated Workforce." <https://www.aar.org/issue/railroad-jobs/#!>
- _____ (2021-B). "Railroad 101." Freight Railroads Fact Sheet.
<https://www.aar.org/wp-content/uploads/2020/08/AAR-Railroad-101-Freight-Railroads-Fact-Sheet.pdf>.
- _____ (2022). "Changes in the Producer Price Index: December 2021 vs. December 2016." <https://www.aar.org/wp-content/uploads/2022/02/AAR-Change-PPI-December-2021-Vs-2016-Chart-1.jpg>.
- Bai, Yong, Steven Schrock, Thomas Mulinazzi, Wenhua Hou, Chunxiao Liu, and Umar Firman (2010). "Estimating Highway Pavement Damage Costs Attributed to Truck Traffic." Mid-America Transportation Center.
<https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1054&context=matcreports>.
- Baumol, William and Robert Willig (1983). "Pricing issues in the deregulation of railroad rates." *Economic Analysis of Regulated Markets*. J. Finisinger, ed. Palgrave Macmillan Publisher.
- Beard, T. Randolph, Jeffrey Macher, and Chris Vickers (2016). "This Time is Different (?): Telecommunications Unbundling and Lessons for Railroad Regulation." *Review of Industrial Organization*. Vol. 49, No. 2. www.jstor.org/stable/44737420.

Bitzan, John and Theodore Keeler (2003). "Productivity Growth and Some of Its Determinants in the Deregulated U.S. Railroad Industry." *Southern Economic Journal*. Vol 70, No. 2 Oct 2003. <https://www.jstor.org/stable/3648967>.

Bitzan, John and Wesley Wilson (2007). "Industry costs and consolidation: efficiency gains and mergers in the U.S. railroad industry." *Review of Industrial Organization*. Vol 30, No. 2 March 2007. <https://www.jstor.org/stable/41799324>.

Bonnet, Céline and Sofia Villas-Boas (2016). "An analysis of asymmetric consumer price responses and asymmetric cost pass-through in the French coffee market." *European Review of Agricultural Economics*, Vol. 43, Issue 5.
<https://academic.oup.com/erae/article-abstract/43/5/781/2444548>

Braeutigam, Ronald (1993). "Consequences of Regulatory Reform in the American Railroad Industry." *Southern Economic Journal*. Vol. 59, No. 3 (Jan 1993).
www.jstor.org/stable/1060285.

Brenan, Megan (2021). "Economic Confidence in U.S. Matches Early Pandemic Low." Gallup. December 22, 2021. <https://news.gallup.com/poll/358367/economic-confidence-matches-early-pandemic-low.aspx>

Brown, Cressie (2014). Testimony to Surface Transportation Board "Petition for rulemaking to adopt revised competitive switching rules." March 26, 2014.
<https://www.stb.gov/wp-content/uploads/Transcript-2014-03-26.pdf>.

Bureau of Economic Analysis (2021). "Table 6.6D. Wages and Salaries Per Full-Time Equivalent Employee by Industry." National Income and Product Accounts.
<https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=2#reqid=19&step=2&isuri=1&1921=survey>.

Bureau of Transportation Statistics (2021-A). "U.S. Vehicle-Miles."
<https://www.bts.gov/content/us-vehicle-miles>

_____ (2021-B). "Freight Activity in the U.S. Expected to Grow 50 Percent By 2050." November 22, 2021.
[https://www.bts.gov/newsroom/freight-activity-us-expected-grow-fifty-percent-2050#:~:text=New%20long%2Dterm%20projections%20released,trillion%20\(in%202017%20dollars\)](https://www.bts.gov/newsroom/freight-activity-us-expected-grow-fifty-percent-2050#:~:text=New%20long%2Dterm%20projections%20released,trillion%20(in%202017%20dollars)).

_____ (2022). "U.S. Ton-Miles of Freight." <https://www.bts.gov/content/us-ton-miles-freight>

Burks, Stephen and Kristen Monaco (2019). "Is the U.S. labor market for truck drivers broken?" Monthly Labor Review. U.S. Bureau of Labor Statistics. March 2019.
<https://doi.org/10.21916/mlr.2019.5>

Cassidy, William (2021). "Record number of new US trucking firms on the books, but not new capacity." *The Journal of Commerce online*. July 14, 2021.

https://www.joc.com/trucking-logistics/truckload-freight/record-number-new-us-trucking-firms-books-not-new-capacity_20210714.html.

Chinowsky, Paul, Jacob Helman, Sahil Gulati, James Neumann and Jeremy Martinich (2017). "Impacts of climate change on operation of the U.S. rail network." *Transport Policy*. Vol 75. March 2019.

<https://www.sciencedirect.com/science/article/pii/S0967070X16308198>

Clevenger, Seth (2021). "How Consolidation is Reshaping Trucking's Technology Sector." *Transport Topics*. February 19, 2021. <https://www.ttnews.com/articles/how-consolidation-reshaping-truckings-technology-sector>

Cotey, Angela (2012). "As diesel costs rise, railroads turn to technology, training and procurement strategies to reduce fuel consumption." *Progressive Railroading*.

<https://www.progressiverailroading.com/mechanical/article/As-diesel-costs-rise-railroads-turn-to-technology-training-and-procurement-strategies-to-reduce-fuel-consumption--29413>.

CRC Group (2021). "Severity and Frequency of Truck Accidents is on the Rise."

<https://www.crcgroup.com/Portals/34/Flyers/Tools-Intel/Trucking%20Accidents%20and%20Claims.pdf?ver=2021-03-19-133940-787>

Davidoff, Thomas and Benjamin Hermalin (2004). "Lecture Notes for 201 (a). University of California at Berkeley.

http://faculty.haas.berkeley.edu/HERMALIN/LectureNotes_v5.pdf.

Davis, David and Wesley Wilson (2003). "Wages in Rail Markets: Deregulation, Mergers, and Changing Network Characteristics." *Southern Economic Journal*. Vol. 69, No. 4 (April 2003). www.jstor.org/stable/1061655.

Dunkelberg, William and Holly Wade (2021). "Small Business Economic Trends." NFIB Small Business Economic Trends Monthly Report. December 2021.

<https://assets.nfib.com/nfibcom/SBET-Dec-2021.pdf>

Ellig, Jerry (2019). "Public Interest Comment1 on The Surface Transportation Board's Proposed Rules Market Dominance Streamlined Approach, Docket No. EP-756, Final Offer Rate Review Docket Nos. EP 755 and EP 665 (Sub-No. 2)." November 6, 2019.

<https://regulatorystudies.columbian.gwu.edu/sites/g/files/zaxdzs3306/f/downloads/PICS/GW%20Reg%20Studies%20-%20STB%20Streamlined%20Market%20Dominance%20and%20Final%20Offer%20PIC%20-%20JEllig.pdf>

_____ (2020). "Public Interest Reply Comment on The Surface Transportation Board's Proposed Rules Final Offer Rate Review, Docket No. EP 755 Market Dominance Streamlined Approach, Docket No. EP 756." January 10, 2020.

<https://regulatorystudies.columbian.gwu.edu/sites/g/files/zaxdzs3306/f/downloads/PICS/GW%20Reg%20Studies%20-%20STB%20Reply%20Comments%20on%20Rate%20Review%20and%20Market%20Dominance%20-%20Jellig.pdf>

Environmental Protection Agency (2019). "Intermodal for Shippers: A Glance at Clean Freight Strategies." SmartWay Transport Partnership. March 2019.

<https://nepis.epa.gov/Exe/ZyPDF.cgi/P100X04Q.PDF?Dockey=P100X04Q.PDF>

Federal Motor Carrier Safety Administration (2021). "Large Truck and Bus Crash Facts 2019". U.S. Department of Transportation. October 2021.

<https://www.fmcsa.dot.gov/safety/data-and-statistics/large-truck-and-bus-crash-facts-2019-pdf>.

General Accounting Office (1990). "Railroad Regulation: Economic and Financial Impacts of the Staggers Rail Act of 1980." Report to Congressional Requesters.

<https://www.gao.gov/assets/rced-90-80.pdf>.

Harney, Sarah (2010). "Too Big for the Road." *Governing: The Future of States and Localities*. August 16, 2010. <https://www.governing.com/archive/too-big-the-road.html>

Harrison, David (2022). "Trucks Are Clogging America's Roads, Delivering Goods and Tearing up Yards." *The Wall Street Journal*. January 26, 2022.

<https://www.wsj.com/articles/trucks-roads-damage-traffic-supply-chain-11643210764>.

Hassett, Kevin and Robert Shapiro (2015). "Regulation and Investment: A Note on Policy Evaluation under Uncertainty, With an Application to FCC Title II Regulation of the Internet." Georgetown University Center for Business and Public Policy. July 2015.

<https://cbpp.georgetown.edu/publications/publications-policy-papers/>

Hirsch, Jerry (2020). "Economics of Electric Trucks Remain an Adoption Challenge." *Trucks.com*. December 14, 2020.

<https://www.trucks.com/2020/12/14/economics-of-electric-trucks/>

Hsing, Y. (1994). "Estimating the Impact of Deregulation on the Elasticity of the Demand for Railroad Services." *International Journal of Transport Economics*. Vol. 21, No. 3. October 1994. www.jstor.com/stable/42747669.

Ibach, Greg (2019). "Comments of the U.S. Department of Agriculture." STB Docket No. EP 755, Final Offer Rate Review, and STB Docket No. EP 756 Market Dominance Streamlined Approach. November 12, 2019.

<https://www.ams.usda.gov/sites/default/files/media/111219USDACommentsinSTBExParte755andExParte756.pdf>

Insurance Institute for Highway Safety (2021). "Large Trucks."

<https://www.iihs.org/topics/large-trucks>.

Kapadia, Shefali (2021). "Trucking operational costs in 6 charts." Transport Dive. January 4, 2021. <https://www.transportdive.com/news/trucking-operational-costs-at-tri-driver-truck-trailer-fuel-insurance/591974/>

Kearney (2021). "Annual State of Logistics Report: Change of plans." Council of Supply Chain Professionals. <https://epages.gopenske.com/rs/004-RHK-737/images/State-of-Logistics-2021-Change-of-plans.pdf>.

Mayo, John, and David Sappington (2016). "Regulation in a 'Deregulated' Industry: Railroads in the Post-Staggers Era." *Review of Industrial Organization*. Vol. 49, No. 2. September 2016. www.jstor.org/stable/44737417.

Mayo, John, and Robert Willig (2018). "Economic Foundations for 21st Century Freight Rail regulation." Georgetown McDonough School of Business. Research Paper No. 3286211. www.ssrn.com/abstract=3286211. Also in *U.S. Freight Rail Economics and Policy: Are We on the Right Track* (2019). Jeffrey Macher and John Mayo, eds. Routledge Press.

McCullough, Gerard (2015). "Constrained Market Pricing and Revenue Adequacy: Regulatory Implications for Shippers and Class I U.S. Freight Railroads." Transportation Research Board. The National Academies of Science, Engineering and Medicine. <https://trid.trb.org/view/1375681>.

McDonald, Noreen, Quan Yuan, and Rebecca Naumann (2019). "Urban freight and road safety in the era of e-commerce." *Traffic Injury Prevention* Vol. 20, Issue 7. <https://www.tandfonline.com/doi/full/10.1080/15389588.2019.1651930>

Meyer, Michael, Michael Flood, Justin Lennon, Mary McVoy, and Chris Dorney. (2014). "Strategic Issues Facing Transportation Volume 2: Climate Change, Extreme Weather Events, and the Highway System: Practitioner's Guide and Research Report." National Cooperative Highway Research Program. NCHRP Report 750. https://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_750v2.pdf.

Miller, Matt (2018). "Trucking Consolidation." *American Journal of Transportation*. September 10, 2018. <https://www.ajot.com/premium/ajot-trucking-consolidation>.

Murphy, Kevin and Mark Zmijewski (2019). Testimony to Surface Transportation Board. November 26, 2019.

Pinkowitz, Lee and Rohan Williamson (2016). "The Staggers Act and Firm performance: Long-Run Evidence." *Review of Industrial Organization*. Vol. 49, No. 2. September 2016. www.jstor.com/stable/44737416.

Pociask, Steve and Liam Sigaud (2021). "Veering Off the Rails: How the Recent Push to Reregulate Railroads Threatens Consumer Welfare." Center for Citizen research. American Consumer Institute. October 21, 2021. <https://www.theamericanconsumer.org/wp-content/uploads/2021/10/Final-Reciprocal-Switching.pdf>.

Point-to-Point (2020). "Freight Consolidation: The Benefits and Drawbacks." Averitt Express. February 27, 2020. <https://blog.averittexpress.com/freight-consolidation-benefits-and-drawbacks>.

Prater, Marvin, Adam Sparger and Daniel O'Neil, Jr (2014). "Railroad Concentration, Market Shares, and Rates." Agricultural Marketing Service. U.S. Department of Agriculture. February 2014.
<https://www.ams.usda.gov/sites/default/files/media/Railroad%20Concentration%2C%20Market%20Shares%2C%20and%20Rates.pdf>.

Rate Reform Task Force (2019). "Report to the Surface Transportation Board." Surface Transportation Board. April 25, 2019. <https://www.stb.gov/wp-content/uploads/Rate-Reform-Task-Force-Report-April-2019.pdf>

Ritz, Robert (2015). "The Simple Economics of Asymmetric Cost Pass-Through." MIT Center for Energy and Environmental Policy Research Working Paper 2015-009. <https://ceep.mit.edu/wp-content/uploads/2021/09/2015-009.pdf>.

Rosenberg, Robert and Time Strafford (2017). "Determining Revenues Adequate to Maintain and Improve Service and Capacity." Association of Transportation Law Professionals Fall Forum. November 10, 2014.
[https://www.sloverandloftus.com/images/pdf/ATLP%20Fall%20Forum%20PPT%20II%20\(RDR6695\).pdf](https://www.sloverandloftus.com/images/pdf/ATLP%20Fall%20Forum%20PPT%20II%20(RDR6695).pdf).

Rossetti, Michael (2003). "Potential Impacts of Climate Change on Railroads." U.S. Department of Transportation.
[www.transportation.gov/sites/dot.gov/files/docs/rossetti CC Impact Railroads.pdf](http://www.transportation.gov/sites/dot.gov/files/docs/rossetti_CC_Impact_Railroads.pdf)

Sanchis, Ignacio Villalba, Ricardo Franco, Pablo Fernández, Pablo Zuriaga, and Juan Torres (2020). "Risk of increasing temperature due to climate change on high-speed rail network in Spain." Transportation Research Part D: Transport and Environment. Vol. 82, May 2020. <https://www.sciencedirect.com/science/article/abs/pii/S1361920919303979?via%3Dihub>.

Schmalensee, Richard et al. (2015). *Modernizing Freight Rail Regulation*. Transportation Research Board on the National Academies Special Report 318. <https://www.railwayage.com/wp-content/uploads/2019/08/SR-318-Modernizing-Freight-Rail-Regulation-FINAL.pdf>

Schulz, John (2013). "Union-free carriers trying hard to stay that way." *Logistics Management*. December 18, 2013.
[https://www.logisticsmgmt.com/article/union free carriers trying hard to stay that way](https://www.logisticsmgmt.com/article/union-free-carriers-trying-hard-to-stay-that-way)

_____ (2021). "Mergers, acquisitions running at fast pace in booming trucking market." Logistics Management. August 9, 2021.
https://www.logisticsmgmt.com/article/mergers_acquisitions_running_at_fast_pace_in_booming_trucking_market.

Scribner, Marc (2022). "Testimony: Proposed railroad industry regulations ignore future automation advancements." Reason Foundation. February 14, 2022.
<https://reason.org/testimony/testimony-proposed-railroad-industry-regulations-ignore-future-automation-advancements/>

Shipper Coalition for Railroad Competition (2017). "Reciprocal Switching: Reply Comments Before the Surface Transportation Board." Docket No. EP 711 (Sub-No. 1). January 13, 2017. <http://www.nitl.org/wp-content/uploads/2017/01/EP-711-1-Reply-Comments-Shipper-Coalition-jan-13-2017.pdf>.

Stephens, Bill (2022). "Railroads and shippers argue over reciprocal switching proposal." *Trains*. March 16, 2022. <https://www.trains.com/trn/news-reviews/news-wire/railroads-and-shippers-argue-over-reciprocal-switching-proposal-before-surface-transportation-board/>

Stern, Carly (2020). "You might want to get back to working on the railroad." OZY. <https://www.ozy.com/the-new-and-the-next/why-you-might-want-to-get-back-to-working-on-the-railroad/264936/>

Stewart, Richard (2013). "Freight Rail Economic Development." Minnesota Department of Transportation and Minnesota Department of Employment and Economic Development. November 2013.
<http://www.dot.state.mn.us/ofrw/fred/PDF/final.pdf>

Trebing, Harry (1980). "Structural Change and Regulatory Reform in the Utilities Industries" *The American Economic Review*. Vol. 70, No. 2. May 1980.
<https://www.jstor.org/stable/1815503>.

U.S. Census Bureau (2021). "2021 Capital Spending report: U.S. Capital Spending Patterns 2010-2019." March 24, 2021.
<https://www.census.gov/library/publications/2020/econ/2021-csr.html>.

Wolf, Connor (2020). "COVID Drives Trucking Industry Consolidation." Transport Topics. December 16, 2020. <https://www.ttnews.com/articles/covid-drives-trucking-industry-consolidation>.

Younis, Mohamed (2021). "Inflation Causing Hardship for 45% of U.S. Households." Gallup. December 2, 2021. <https://news.gallup.com/poll/357731/inflation-causing-hardship-households.aspx>.

About the Authors

Dr. Robert J. Shapiro is the chairman of Sonecon, LLC, a firm in Washington D.C. that provides economic analysis and advice to U.S. and foreign government officials, business executives, and leaders of non-governmental organizations. He is also a Fellow of the Georgetown University Center for Business and Public Policy, a board director of Overstock.com, and an advisory board member of Cote Capital and Civil Rights Defenders. Dr. Shapiro has advised Presidents Bill Clinton and Barack Obama, Vice President Albert Gore, Jr., British Prime Minister Tony Blair and Foreign Secretary David Miliband, Secretary of State Hillary Clinton, Treasury Secretaries Robert Rubin and Timothy Geithner, and other senior members of the Clinton, Obama and Trump administrations and the U.S. Congress. Dr. Shapiro and Sonecon also have provided analysis and advice to companies including AT&T, Exelon, ExxonMobil, Fujitsu, Gilead Sciences, Google, Nasdaq, and UPS, as well as many NGOs including the International Monetary Fund, the Brookings Institution, the Center for American Progress, and the U.S. Chamber of Commerce. Before founding Sonecon, Dr. Shapiro was the U.S. Under Secretary of Commerce for Economic Affairs. Prior to that, he was co-founder and Vice President of the Progressive Policy Institute and the Legislative Director and Economic Counsel to Senator Daniel Patrick Moynihan. He also served as the principal economic advisor to Bill Clinton in his 1991-1992 presidential campaign, senior economic adviser to Hillary Clinton in her 2015-2016 campaign, and economic-policy adviser to the campaigns of Joseph Biden, Barack Obama, John Kerry and Albert Gore, Jr. He holds a Ph.D. and M.A. from Harvard University, a M.Sc. from the London School of Economics and Political Science, and an A.B. from the University of Chicago.

Luke Stuttgen is an associate of Sonecon specializing in labor and health economics and a health economist for Aceso Global, where he works on donor-funded analysis and projects to improve health systems in low-income and middle-income countries. He served as a Staff Economist at the White House Council of Economic Advisors during the Biden and Trump administrations where he conducted economic analysis of labor, health, and trade policy. Mr. Stuttgen also has worked as a healthcare consultant focusing on workforce optimization and process improvement for large hospital systems and academic medical centers. He holds a B.S. degree in Mathematics and Mathematical Economics from the University of Wisconsin-Madison, a M.A. in International Economic Policymaking from the Paris School of International Affairs, and a M.Sc. in International Political Economy from the London School of Economics and Political Science.