241892

ENTERED
Office of Proceedings
October 26, 2016
Part of
Public Record

BEFORE THE
SURFACE TRANSPORTATION BOARD

STB Docket No. EP 711 (Sub-No. 1)

RECIPROCAL SWITCHING

OPENING COMMENTS OF NORFOLK SOUTHERN RAILWAY COMPANY

James A. Hixon
John M. Scheib
David L. Coleman
Garrett D. Urban
Aarthy S. Thamodaran

Norfolk Southern Corporation
Three Commercial Place
Norfolk, VA 23510
(757) 629-2657

Raymond A. Atkins
G. Paul Moates
Matthew J. Warren
Richard E. Young
Hanna M. Chouest

SIDLEY AUSTIN LLP
1501 K Street, N.W.
Washington, D.C. 20005
(202) 736-8000

Counsel for Norfolk Southern Railway Company

October 26, 2016

TABLE OF CONTENTS

TABLE OF CONTENTS, CONT'D

I. Executive Summary

The Surface Transportation Board's ("STB" or "Board") proposal[1] to topple decades of precedent regarding forced switching is unjustified, unlawful, and unwise. The agency never identifies the problem it seeks to address, never justifies the departure from precedent relied on by the industry, and never distinguishes independent studies the agency commissioned by Christensen and InterVISTAS. The agency also violates congressional direction by, among many failings, attempting to use forced switching as back-door rate regulation. The proposal ignores all prior submissions about the potential adverse impact on operating efficiency, investments, and the industry's financial health, and offers vague compensation proposals that likely violate the Constitution. The Board should abandon the proposal.

The Staggers Act of 1980 ("Staggers Act" or "Staggers") was an act of necessity and regulatory genius. It dismantled failed regulatory policies that forced railroads to keep open inefficient routes and to equalize rates for all customers, ushering in a new era that transformed the U.S. freight rail industry. The industry flourished. The Interstate Commerce Commission ("ICC" or "Commission") facilitated this renaissance by carefully crafting rate regulations based on sound economic principles to protect shippers from abuses of market power. And the agency—with the blessing of the federal courts—restricted its coercive forced access powers granted by Congress to cases where a railroad engaged in anticompetitive conduct by using its market power to extract unreasonable terms, deprive a shipper of a more efficient route, or disregard the shipper's needs by rendering inadequate service. *Midtec Paper Corp. v. I.C.C.*, 3 I.C.C.2d 171, 181-82 (1986) (*"Midtec II"*).

---

[1] *See Petition for Rulemaking to Adopt Revised Competitive Switching Rules*, Docket No. EP 711 (Sub-No. 1) (served July 25, 2016) ("Decision").

The agency and courts were adamant, however, that the coercive forced access powers not be used as an alternative path to rate regulation.

A group of disgruntled shippers have been determined to unravel this regulatory paradigm ever since, indifferent to its resounding success. Dissatisfied with economically sound rate regulations that carefully balanced the need of the carrier to engage in differential pricing with the need to protect shippers from abuses of market dominance, this contingent of shipper groups petitioned the ICC, federal courts, and Congress to use forced access to supplant market forces and drive rates below those prescribed by rate regulations, thus depriving the railroads of the ability to engage in otherwise necessary and lawful demand-based differential pricing. The ICC, federal courts, and Congress all wisely refused this gambit. "Congress is the proper agency to change an interpretation of the Act unbroken since its passage, if the change is to be made." *Blau v. Lehman*, 368 U.S. 403, 413 (1962). Indeed, Congress rejected requests to transform forced access into an alternative pathway to lower rates a whopping 18 times.

Now enter the STB. Undaunted by Congress' enduring refusal to change the forced access regime, the agency proposes to transform 49 U.S.C. Section 11102(c) into an alternative path to lower rates.

The Board's proposal is unjustified. The agency provides no adequate justification for this abrupt reversal of longstanding policies that have engendered serious reliance interests. Indeed, it offers no clue about the problem the agency seeks to solve, instead citing to purported industry changes and a lack of cases under the *Midtec* standard as justifying the agency's about face on forced access. Never mind that its own independent studies show that industry changes, including Class I consolidation and improved financial health, did *not* increase market power abuses. Never mind that the purported "dearth" of forced access cases is neither

surprising nor cause for concern: ICC officials expected the railroads and shippers to negotiate their problems and cooperate in resolving difficulties.

The Board's proposal is also unlawful. It is a backdoor attempt to use forced access provisions as an additional path to potentially lower rates in direct contravention of established judicial precedent and consistent congressional directives. It also is an unlawful departure from the historic definition of "public interest" followed by the agency for almost 100 years, again contrary to congressional intent. Further, it is an illogical interpretation of "necessary for competitive rail service" without even a superficial examination of whether the alternative is more efficient, in hopeless conflict with the core framework of the Staggers Act.

The Board's proposal is also ill-advised. It ignores the collateral damage that is destined to result from any forced access proposal, including the adverse impact on the financial health of the industry, rail operations and efficiency, and future investments. The Board's hope to control these harms through case-by-case adjudications is equal parts over-optimistic and naïve. Moreover, the Board's vague compensation proposals violate the Staggers framework, sound economic principles, and the Constitution. The agency must permit a railroad forced to relinquish its right to the long haul to recover the full opportunity costs of that lost traffic. Otherwise, the compensation would be confiscatory by denying the railroad the ability to engage in lawful differential pricing to recover the joint and common costs of its network, and would impede the industry's efforts to achieve revenue adequacy, necessary for long-term investment and a safe and efficient rail system.

Norfolk Southern Railway Company ("NS" or "Norfolk Southern") offers six witness statements in support of its opposition to the Board's proposal.

- **David R. Goode**, former Chairman, President, and CEO of Norfolk Southern from 1992 through 2006. Mr. Goode describes NS's serious reliance interests in the agency's longstanding forced access policy. The agency's steadfast encouragement of efficient single-line service was an essential underpinning of the Conrail transaction.
- **John H. Friedmann**, Vice President Strategic Planning for Norfolk Southern. Mr. Friedmann explains how this forced access proposal would fundamentally alter NS's investment decision-making and adversely affect NS's levels of investment and quality of service, leading to a less reliable and less resilient network.
- **Jeffrey H. Sliger**, Assistant Vice President Transportation Network for Norfolk Southern. Mr. Sliger explains how forced access will slow velocity, increase variability, and degrade service. He also explains that the "greatest misconception" with the proposed case-by-case approach is the belief that the STB can foresee traffic flows that will arise under each forced access application, and predict and calibrate the harm.
- **Mark Armstrong** (University of Oxford, England) and **David Sappington** (University of Florida). The professors discuss sound economic principles for forced access pricing, and the necessity of permitting lost contribution in the access compensation scheme to protect differential pricing and preserve contributions to fixed and common costs of the network.
- **Randall Lutter** (University of Virginia) (former senior economist at the Office of Information and Regulatory Affairs, Office of Management and Budget (OMB), and the President's Council of Economic Advisers). Professor Lutter explains the importance of performing a benefit-cost analysis for a major regulatory action—even by independent federal agencies—a step the Board skipped.
- **Michał Grajek** (European School of Management and Technology, Germany). Professor Grajek describes his empirical research on the impact of access regulations on investment, as published with his colleague Prof. Lars-Hendrik Röller, now director general of the economic and financial policy division of the German government. This econometric analysis revealed that comparable access regulations in the EU's telecommunications industry reduced private investments over a decade by $15 billion, over 20% of the industry infrastructure stock. That net loss would have been over $36.5 billion without the counterbalancing investments from new market entrants, who will not materialize in the U.S. rail industry.

Below, **Section II** provides historical background behind the resounding success of Staggers. **Section III** explains how the Board offered no justification for its departure from longstanding precedent that engendered serious reliance interests. **Section IV** details the many legal deficiencies with the proposed rule. **Section V** portrays the reckless nature of this proposal, which will restrict lawful and essential differential pricing, reduce capital investments, and frustrate operating efficiency; evils the Board cannot keep under control or manage on a case-by-case basis. **Section VI** explains why the Board must conduct a benefit-cost and environmental analysis. **Section VII** concludes by specifying the access pricing principles the Board must follow by statute, sound economics, and the Constitution.

II. Background

The history of the rail renaissance following Staggers and the decades of industry decline that preceded it are well-known. The Board's proposal would in many ways rewind the clock and mire the industry in the same policies that led to economic ruin for dozens of railroads and required congressional rescue efforts.

a. After decades of heavy-handed regulations, Congress directed the ICC to embrace differential pricing and remove forced inefficient routings.

By the 1970s, the industry was in dire straits. Because of heavy-handed regulation, the industry had devolved into a system characterized by open routings and rate equalization. "Open routings" refers to the regulatory straightjacket whereby through routes were created on practically all possible combinations of railroad tracks between two points. *See Baltimore Gas & Electric Co. v. United States*, 817 F.2d 108, 110 (D.C. Cir. 1987). "Rate equalization" refers to the demand of regulators that all routes between the same two points—including single-line routes—be offered to shippers at the exact same rates, without regard to the actual cost of providing the service. *Id.* As a result, between 1937 and 1980, 27 railroads

went bankrupt.[2] And even those railroads that did not declare bankruptcy were close to collapse.

To curb this financial crisis, Congress reformed the outdated regulatory scheme by passing the Staggers Act. First, Congress directed the ICC to remove the existing regulatory chokehold of forced inefficient routings.[3] Second, Congress mandated that the ICC permit demand-based differential pricing to restore the financial health of the industry. In requiring its use, Congress recognized that differential pricing is in the best interest of all shippers, because such a policy is necessary to enable railroads to earn revenues sufficient to support adequate service and capital investment.[4] Congress therefore designed an elaborate statutory framework to protect shippers from unreasonable prices while permitting carriers to engage in differential pricing.

Congress also clarified that the ICC could compel reciprocal switching agreements where "practicable and in the public interest" or "necessary for competitive rail service." But it did not intend for that coercive power to provide an alternative to the statutory rate regulation framework or to restructure the industry.[5] Rather, Congress intended for reciprocal switching to be used narrowly

---

[2] RICHARD D. STONE, THE INTERSTATE COMMERCE COMMISSION AND THE RAILROAD INDUSTRY: A HISTORY OF REGULATORY POLICY, 113 (1991).

[3] H.R. REP. NO. 96-1430, at 111 (1980).

[4] H.R. REP. NO. 96-1035, at 39 (1980) ("The Committee understands the necessity of such differential pricing, and has designed a regulatory system which allows for such pricing decisions. In the absence of the regulatory flexibility which permits differential pricing, all shippers would be harmed."). The InterVISTAS Report similarly recognized that differential pricing is "not merely an academic point. Historically many rail carriers were driven to bankruptcy and/or liquidation by regulatory pricing policies that violated these fundamental principles of railroad economics. Much of their track was ultimately abandoned as being uneconomic, to the detriment of shippers on those lines." InterVISTAS Consulting Inc., *Surface Transportation Board: An Examination of the STB's Approach to Freight Rail Rate Regulation and Options for Simplification*, at 22 (Sept. 14, 2016) ("InterVISTAS Report").

[5] Staggers rejected an initial proposal from the administration that called for mandatory reciprocal switching in all metropolitan areas. Cong. Rec. at S3510 (Mar. 27, 1979). Indeed, Transportation

to remedy service failures and inefficiencies resulting from anticompetitive conduct, as that remedy had been applied since the 1930s. S. REP. NO. 470, at 41 (1979) ("In areas where reciprocal switching is feasible, it provides an avenue of relief for shippers served by only one railroad where service is inadequate.").

b. The ICC follows Congress' deregulatory directive.

Following passage of the Staggers Act, the ICC took steps to (1) improve efficiencies in the rail system; (2) establish a robust and economically-sound framework for rate regulation; and (3) adopt forced access provisions narrowly targeted at anticompetitive conduct.

Efficiency. The ICC removed the chokehold of its prior rules that forced railroads to maintain inefficient routings. It encouraged single-line movements, permitted industry consolidation with proper safeguards to preserve competitive options, and eased federal red tape that was impeding the abandonment of unprofitable lines. For example, the ICC rejected prior merger conditions that it found "hamper carrier efforts to rationalize their systems by freezing existing junctions and interchanges." *Rulemaking Concerning Traffic Protective Conditions In Railroad Consolidation Proceedings*, 366 I.C.C. 112, 114 (1982) ("*Traffic Protective Conditions*"). And the Commission acknowledged that "routing inefficiency harms carriers as well as shippers and harms the public interest generally." *Conrail – Exemption – Abandonment of the Weirton Secondary Track in Harrison and Tuscarawas Counties, OH*, Docket No. AB-167 (Sub-No. 1088X) at 8 (ICC served June 14, 1989). In the merger context, the Commission approved

---

and Commerce Subcommittee Chairman (and Staggers Act sponsor) Jim Florio made it clear that Congress intended to adopt a narrow reciprocal switching provision: "I do not expect . . . these provisions [on reciprocal switching] to dramatically change the railroad map of the United States." Cong. Rec. H5902-H5903 (June 30, 1980) (Statement of Congressman Florio).

mergers that would improve single-line service, noting that "shippers prefer single line or system service because it improves reliability and transit times, and equipment availability." *Union Pac. Corp. et al. – Control – Missouri Pac. Corp. & Missouri Pac. R.R. Co.*, 366 I.C.C. 462, 489 (1982). As the InterVISTAS Report concluded, due to the abandonments, reroutings, and consolidations "that occurred in the industry since the Staggers Act, the rail network was considered to be close to what can be seen as an efficient and rationalized network by 2007." InterVISTAS Report at 18.

Differential Pricing. Coal Rate Guidelines set the core foundation for rate regulation for the next three decades. With this decision, the ICC adopted Constrained Market Pricing to serve as guidelines for determining rate reasonableness for all regulated commodities (not just coal),[6] cautiously balancing the right of railroads to engage in demand-based differential pricing against the need to protect shippers where there was a lack of effective competition. In that decision, the ICC expressed its "commitment to the concept of demand-based differential pricing, whereby the carrier may price its services according to the varying demand elasticities for them." *Coal Rate Guidelines, Nationwide*, 1 I.C.C. 2d 520, 523 (1985). And in a concurring comment, Commissioner Lamboley noted that "the fundamental purpose and significance of the Ex Parte 347 rulemaking proceeding has been to encourage market-based solutions in circumstances in which there may not be effective competition, by adopting realistic, commonsense guidelines upon which principals in various industries affected can undertake both short- and long-term business planning, as well as resource commitment." *Id.* at

[6] In *Non Coal Proceedings*, STB Ex Parte No. 347 (Sub-No. 2), at 14 (served Dec. 31, 1996), the Board said "We recognize that CMP provides the only economically precise measure of rate reasonableness and therefore must be used wherever possible." *See also* Coal Rate Guidelines – Non-Coal Proceedings, Ex Parte No. 347 (Sub-No. 2) (ICC served April 8, 1987) (not printed) (stating that the Commission has "since endorsed the application of Coal Rate Guidelines to non-coal shipments").

550. By permitting demand-based differential pricing, the *Coal Rate Guidelines* did just that.

Forced Access. The ICC recognized the statutory right of a carrier to the long haul. The ICC therefore understood that forcing an alternative through route, switching, or terminal access was only appropriate as a remedy for anticompetitive conduct. *See Midtec II*, 3 I.C.C.2d at 181-82. And the ICC made it clear that forced access could not be used as an alternative to rate regulation.[7] The agency understood that using forced access as alternative rate regulation would fundamentally restructure the freight rail industry and undermine one of the central objectives of the Staggers Act—permitting demand-based differential pricing. If a railroad was providing reasonable single-line service over an efficient route, at reasonable rates, the ICC wisely would not intrude.

c. Although the industry flourished, not all shippers were satisfied.

By following the deregulatory path laid out by Congress, the ICC oversaw the rebirth of the freight rail industry. A lean and more efficient railroad industry took back market share from other transportation modes. As the railroads grew more efficient, rates fell across the board.[8] Financial health improved. Billions of dollars in private investment improved service.[9] And the industry attained unparalleled safety levels.[10]

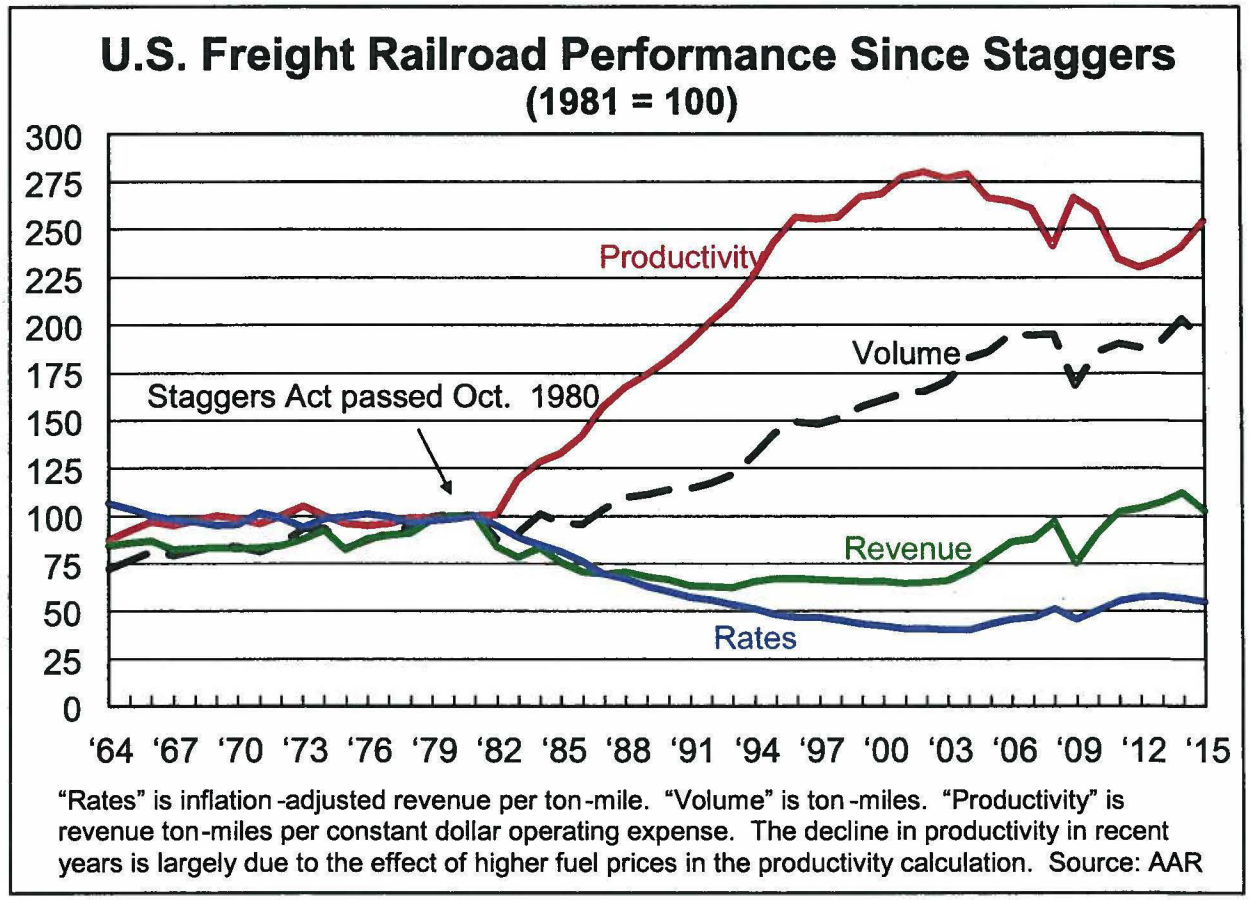
---

[7] *Midtec Paper Corp. v. I.C.C.*, 1 I.C.C.2d 362, 365 (1985) ("*Midtec I*"); *see also Entergy Arkansas, Inc. & Entergy Services, Inc. v. Union Pac. R.R. Co. et al.*, Docket No. 42104, at 15 (served March 15, 2011) ("[T]he competitive access rules were promulgated not to provide shippers with an alternative form of rate relief, but to offer a competitive remedy where a bottleneck carrier has exploited its market power.").

[8] *See, e.g.*, Association of American Railroads, *A Short History of U.S. Freight Railroads* at 4 (2016) ("Average rail rates (measured by inflation-adjusted revenue per ton-mile) were 45 percent lower in 2015 than in 1981.").

[9] *See, e.g.*, Association of American Railroads, *Americas Freight Railroads: Global Leaders* 2 (2015) ("From 1980 to 2014, U.S. freight railroads spent $575 billion—of their own funds, not taxpayer

Figure 1
The Impact of Staggers



The combination of Congress' wise action and the ICC's careful implementation of the new regulatory landscape is now heralded as one of the most remarkable regulatory—or more accurately, deregulatory—success stories of the last century. The legislation has been widely recognized as a "stroke of genius" that "allowed the revitalization of a previously deeply troubled U.S. railroad industry by

---

funds—on locomotives, freight cars, tracks, bridges, tunnels and other infrastructure and equipment. That's more than 40 cents out of every revenue dollar.").

[10] *See, e.g.*, Association of American Railroads, *Economic Deregulation Drives Safety* (2016) (discussing an independent study that found that "partial deregulation of the freight railroad industry in 1980 dramatically improved safety by spurring greater investment in rail infrastructure"). J. Ellig, *The Regulatory Determinants of Railroad Safety*, 49 REV. IND. ORG. 371 (2016) (finding that Staggers Act did more to improve safety than safety regulations).

removing the many shackles of over-regulation." *Rail Transportation of Grain*, STB Ex Parte 665, at 6 (served Jan. 14, 2008) (Commissioner Buttrey, commenting). The Board,[11] Congress,[12] the Government Accountability Office ("GAO"),[13] and U.S. Department of Transportation ("USDOT")[14] all have recognized the wisdom of the policies embodied in the Staggers Act and the success of those policies in revitalizing the nation's railroads.

But not all shippers were satisfied. By its very nature, demand-based differential pricing means some shippers pay higher rates than others. Those shippers want the same lower rates enjoyed by other shippers with greater competitive options, indifferent to the long-term consequences for the railroad industry and, in turn, all shippers. And so certain shipper groups launched a three-decade long campaign to unravel Staggers' success by using the agency's forced access provisions to combat the ability of railroads to engage in differential pricing. Shippers first urged the agency to curtail any demand-based differential pricing with a liberal forced access regime. *See Intramodal Rail Competition*, 1 I.C.C.2d 822 (1985). The Commission refused. *Id.* The disappointed shippers then petitioned the federal courts to force the ICC to adopt an expansive reading of the forced access provisions. The federal courts twice refused, providing independent

---

[11] *See, e.g., Review of Rail Access and Competition Issues*, 3 S.T.B. 92, 92 (1998) ("There is no dispute that the Staggers Rail Act of 1980 . . . as implemented and administered first by the Interstate Commerce Commission . . . and now by the Board, has revitalized American railroads.").

[12] *See, e.g.*, H.R. REP. NO. 104-311, at 91 (1995), reprinted in 1995 U.S.C.C.A.N. 793, 803 ("The Staggers Act has produced a renaissance in the railroad industry.").

[13] U.S. Gov't Accountability Office, GAO/RCED-90-80, *Railroad Regulation: Economic and Financial Impacts of the Staggers Rail Act Of 1980, at* 3-4 (May 1990) (finding that the Staggers Act made railroads "more competitive" and that "[s]hippers have benefited from reduced railroad regulation").

[14] *See The 25th Anniversary of the Staggers Rail Act of 1980: A Review and Look Ahead*, STB Ex Parte No. 658, Hr'g Tr. at 14-15 (Oct. 19, 2005) (testimony of USDOT) ("The Department of Transportation considers the Act a resounding success. We do so because in sum the statute did what it was designed to do. It revitalized the railroad industry and by so doing benefitted shippers and consumers throughout the economy.").

judicial interpretations of the statute. *See Baltimore Gas*, 817 F.2d at 114; *Midtec Paper Corp. v. United States*, 857 F.2d 1487, 1514 (D.C. Cir. 1988). Frustrated shipper groups returned to Congress, seeking legislation to compel the use of forced access as an alternative for rate regulation. Congress refused, not once, not twice, but at least 18 times.[15]

III. There Is No Coherent Justification For Departure From Longstanding Agency Precedent.

For three decades, the ICC, STB, federal courts, and Congress have steadfastly rejected shippers' demands to undermine the ability of railroads to engage in demand-based differential pricing by transforming the forced access provisions into a pathway to lower rates. But now the STB proposes to yield to those shippers' same demands, without any reasonable justification for its complete reversal of longstanding precedent on which the industry has strongly relied.

a. The Board has a heighted burden to justify a departure from longstanding policies relied on by the industry.

One of the most basic procedural requirements of administrative rulemaking is that an agency must give adequate reasons for its decisions, and that this requirement is heightened where an agency decision reverses longstanding agency policy that has engendered serious reliance interests. *See Encino Motorcars, LLC v. Navarro*, 136 S. Ct. 2117, 2125-26 (2016). So while an agency "need not always provide a more detailed justification than what would suffice for a new policy created on a blank slate . . . [s]ometimes it must—when, for example, its new policy rests upon factual findings that contradict those which underlay its prior policy; or when its prior policy has engendered serious reliance interests that must be taken into account." *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 515 (2009).

---

[15] *See infra* note 34.

Far from taking them into account, the STB has ignored the serious reliance interests engendered by its longstanding forced access policies. The Conrail Transaction is perhaps one of the most prominent examples of industry reliance upon these policies. As NS's former Chairman and CEO David R. Goode explains, based on his firsthand experience:

> the Conrail Transaction was fundamentally premised on Norfolk Southern's assumption that it would retain the continued ability to provide single-line service. Operating under this assumption, Norfolk Southern secured one of the largest debt financing arrangements, at the time, for the transaction and made substantial capital investments throughout its network, both with full confidence that the expense of such financing and investments would be recouped from the revenue growth as a result of the improved service product, expanded market access, increased operating efficiency, and enhanced competitiveness enabled by more single-line hauls.

V.S. David R. Goode at 20. Norfolk Southern poured hundreds of millions of dollars into its network based on the assumption that it would reap the rewards from providing efficient single-line service, knowing that the Board's forced access rules that could require the company to forego this single-line, long haul service were sharply cabined by longstanding Board policy. *See id.* at 11-18. At the time of the Conrail Transaction, Mr. Goode also testified before Congress that "new NS will realize long-haul opportunities to move freight, and we will be able to improve service for East Coast ports and shippers throughout the country. End-to-end rail transactions like ours promote the inherent efficiencies of single-line rail service. Shippers will be the greatest beneficiaries, experiencing better service and new opportunities to grow."[16] The Board wholeheartedly agreed:

---

[16] 1997 Annual Report, Chairman's Letter, Norfolk Southern Corp., *available at* http://globaldocuments.morningstar.com/documentlibrary/document/308b24856d30d8bf.msdoc/original).

> [A] prime objective of the proposed Conrail Acquisition is the ability to maximize single-line service. This would enable complete control of train movements by a single carrier, and would result in simplified record keeping and reduced time loss in the interchange of cars. Single-line service permits greater flexibility to freely change train priorities in reaction to market demands without the need to coordinate with other railroads, such as a terminal operator located in the middle of the route.[17]

The Board's reversal of longstanding policy that "does not take account of legitimate reliance on prior interpretation[s]" is "arbitrary, capricious [or] an abuse of discretion." *Smiley v. Citibank (S.D.)*, 517 U.S. 735, 742 (1996) (internal citations omitted). There was no accounting here, just deafening silence. "The STB's proposed competitive switching rules," Goode explains, "directly contradict Norfolk Southern's core assumption that it would retain the continued ability to provide single-line service. Thus, the STB's proposed rules ignore Norfolk Southern's investment-backed reliance on the perpetuation of the existing regulatory regime." *Id.* at 21.

b. <u>The Board failed to adequately justify its reversal that would upset the long-settled expectations of the industry.</u>

None of the Board's four proffered justifications for departing from its longstanding forced access rules have merit.

i. *Changes in the industry do not warrant upending the existing forced access rules.*

The Board begins with the faulty assertion that the numerous changes in the industry since the 1980s—including the consolidation and improved health of Class I carriers—warrant changes to its forced access rules.

---

[17] *CSX Corp. and CSX Transp., Inc., Norfolk Southern Corp. and Norfolk Southern Ry. Co. – Control and Operating Leases/Agreements – Conrail Inc. and Consolidated Rail Corp.*, Volume 6C Appendices J through N, Docket No. FD 33388, 1998 STB LEXIS 1549, at *93 (served May 22, 1998).

With respect to the improved financial health of the industry, the Board has a congressional mandate to promote the revenue adequacy of carriers, not treat improving railroad finances as a problem that needs to be solved. 49 U.S.C. § 10704(a). Furthermore, the Christensen study concluded that "the increase in rail rates in recent years appears to be the result of increasing cost and does not appear to reflect an increase in the exercise of market power."[18] The undisputed fact that the railroads have improved their financial position as a result of Staggers' sound economic principles does not lead to the conclusion that the railroads are abusing their market position warranting a change in policy. As the USDOT explained:

> The Study's most fundamental conclusions are that railroad deregulation has been a success, that the industry must be able to engage in differential pricing to remain viable, and that overall there is no probative evidence of market power abuse—rate increases in recent years notwithstanding.[19]

Although it is true that there has been considerable consolidation in the industry over the last 30 years, the Board has consistently used its "broad conditioning authority to preserve or enhance service and competitive opportunities" when conditioning mergers.[20] For example, in the *Conrail* decision, the Board required the applicant railroads to preserve reciprocal switching agreements and to establish three carefully managed "shared asset areas" to preserve competition in major metropolitan areas. *Id.* at 255-56. In other instances, the Board has imposed conditions including trackage or other access

---

[18] Laurits R. Christensen Associates, Inc., *An Update to the Study of Competition in the U.S. Freight Railroad Industry*, at 4-7 (2010).

[19] *Study of Competition in the Freight Railroad Industry*, STB Ex Parte No. 680, Letter from U.S. Department of Transportation, at 1 (filed Dec. 19, 2008).

[20] *CSX Corp. & CSX Transp., Inc., Norfolk Southern Corp. & Norfolk Southern Ry. Co.—Control & Operating Leases/Agreements—Conrail Inc. & Consolidated Rail Corp.*, 3 S.T.B. 196, 250 (1998).

rights to preserve rail-to-rail competition. And, such conditions have been successful in preserving competition, as intended:

> Since 1980 at least, we have consistently imposed merger conditions to preserve two-railroad service where it existed, and we have imposed remedies to preserve competition where the number of carriers serving a shipper has gone from three to two in limited circumstances on a case-by-case basis. The overall result, so far, has been that railroads have continued to face effective competition, either from other railroads or other modes, that has forced them to pass on the preponderance of the significant efficiency gains that they have achieved (through mergers and other means) to the shippers that they serve.

Major Rail Consolidations Procedures, 5 S.T.B. 539, 548-49 (2001).[21] Thus, despite the Board's comments to the contrary in the Decision, there has not been a significant adverse change in the competitive marketplace since *Major Rail Consolidation Procedures*—in large part, due to the Board's conditions carefully designed to remedy any potential anticompetitive effects resulting from industry mergers.

---

[21] *See also Norfolk Southern Ry. Co. – Acquisition & Operation – Certain Rail Lines of the Delaware & Hudson Ry. Co., Inc.*, Docket No. FD 35873, at 17 (May 15, 2015) ("Generally, the Board focuses on preserving competition between two rail carriers; it protects against '2-to-1' reductions in competition, but in minor transactions it does not generally remedy transaction-related reductions of competitive options from three carriers to two carriers absent a showing of specific harm. *See Union Pac. Corp. – Control & Merger – S. Pac. Rail Corp.*, 1 S.T.B. 233, 351 (STB served Aug. 12, 1996) (stating that the Board has "focused usually on preserving two-railroad competition, not on preserving three-railroad competition") ("UP/SP Merger 1996"). The Board has not historically acted to increase shippers' competitive options. *See Burlington N. Inc. – Control & Merger – Santa Fe Pac. Corp.*, (BN/SF Merger 1995) 10 I.C.C.2d 661, 57 (1995). In addition, although a transaction may result in some general changes to competition for specific shippers, the Board seeks to protect competition overall, not specific competitors. *See, e.g., Canadian Nat'l Ry. Co – Control – Ill. Cent. Corp.*, FD No. 33556, slip op. at 20 (STB served May 25, 1999); *Wisc. Cent. Transp. Corp.-Continuance in Control-Fox Valley & W. Ltd.*, (Wisc. Cent/Fox Valley 1992) 9 I.C.C.2d 233, 239-40 (ICC served Dec. 4, 1992).").

Because the Board's approval of industry competition has expressly preserved competition, it is illogical for the Board to use its own decisions to approve industry mergers as a reason for overhauling the forced access rules. Each of those mergers was approved by the Board because they were in the public interest and, ironically, largely because they enhanced single-line competition.[22] It makes no sense for the Board to declare now, decades later, that mergers that were found to be in the public interest and carefully structured to be pro-competitive, on balance, are suddenly an excuse to revamp the forced access regulations.

ii. *The lack of cases brought under the Board's current standard does not suggest a need for new regulation.*

The fact that there has been a "dearth of cases brought under § 11102(c) in the three decades since *Intramodal Rail Competition*," Decision at 9, does not justify new regulation. When regulations are certain, railroads are able to conform their pricing and service decisions in accordance with them. Shippers also understand their regulatory options and negotiate accordingly.[23] Under such conditions, it is logical to expect few cases to arise.

---

[22] *See, e.g., Dakota, Minnesota & Eastern R.R. Corp. & Cedar American Rail Holdings Inc. – Control – Iowa, Chicago & Eastern R.R. Corp.*, 6 S.T.B. 511, 525 (2003) (approving common control and noting that it will offer "more efficient and competitive single-system access"); *Canadian Nat'l Ry. Co. et al. – Control – Illinois Cent. Corp. et al.*, 4 S.T.B. 122, 142 (1999) (noting that the merger made "possible a new, single-line service alternative for many shippers"); *Union Pac. Corp., et al. – Control & Merger – S. Pac. Rail Corp., et al.*, 1 S.T.B. 223, 370 (1996) (noting that even with recent mergers "rail competition has thrived, and shippers have continued to enjoy increasingly lower rates"); *Burlington N. Inc. & Burlington N. R.R. Co. – Control & Merger – Santa Fe Pac. Corp & The Atchison, Topeka & Santa Fe Ry. Co.*, 10 I.C.C. 2d 661 741 (1995) ("A single-line railroad route is becoming more important for carriers wanting to compete for service-sensitive freight."); *Union Pac. Corp., et al. – Control – Missouri Pac. Corp. & Missouri Pac. R.R. Co.*, 366 I.C.C. 462, 489 (1982) (noting that "shippers prefer single line or single system service because it improves reliability and transit times, and equipment availability"); *Burlington N., Inc. – Control & Merger – St. Louis-San Francisco Ry. Co.*, 360 I.C.C. 788, 935 (1980) ("The merged company will be able to provide new single-line service, reduced transit times, more efficient and frequent service, and improved car utilization.").

[23] *See, e.g., Petition of Norfolk S. Ry. Co. & CSX Transp. Inc. To Institute a Rulemaking Proceeding To Exempt Railroads from Filing Agricultural Transp. Contract Summaries*, STB Ex Parte No. 725,

Moreover, forced access cases have been rendered largely unnecessary by the fact that build-ins and build-outs and voluntary reciprocal switching naturally arise where they make economic sense. Thus, leading economists are equally baffled by the Board's logic. "The problem that the Board seeks to solve with this modified policy is not apparent . . ." V.S. Armstrong/Sappington at 4. The professors explain,

> [t]he absence of shipper petitions for forced access does not imply that the Board's historic policy has failed to protect shippers and promote efficient reciprocal switching. The absence of such petitions may indicate instead that rail carriers have voluntarily negotiated reciprocal switching agreements over time as the carriers identified settings where such agreements produced cost savings. Voluntary agreements of this sort should be expected because rail carriers have a natural incentive to undertake reciprocal switching whenever it reduces industry transport costs.

Id. The STB itself has recognized this feature of the U.S. railroad industry: "Merged railroads, regardless of whether they have bottleneck facilities or market dominance, have the incentive to encourage full use of the most efficient routing, even when it entails a joint-line alternative to a single-system route."[24]

Accordingly, the relatively few cases filed should not be construed as evidencing a need for further regulatory reform. This principle has been espoused in various regulatory contexts by the ICC and others, including shipper groups:

- *GAO*: "Officials in the ICC Chairman's office, Office of Hearings, and Suspension Board told us that they expect [Ex Parte No. 445 (Sub-No. 1)] to reduce the number of protests brought before the Commission. Their view is based on an expectation that railroads and shippers will

---

at 6 (served Aug. 11, 2014) (V.C. Miller, concurring) ("My view is that when shippers have more information they can make better decisions and, as a consequence, fewer disputes will arise.").

[24] *Norfolk S. Corp. & Norfolk S. Ry. Co. – Control & Consolidation Exemption – Algers, Winslow & W. Ry. Co.*, Docket No. FD 34839 (Feb. 15, 2007).

negotiate their problems and cooperate in resolving difficulties." GAO, *Railroad Regulation: Competitive Access and Its Effects on Selected Railroads and Shippers*, Report to the Chairman, Subcommittee on Oversight and Investigations, Committee on Energy and Commerce, House of Representatives, at 24 (June 1987).

- *ICC*: We "fully expect that the number of instances in which the [Coal Rate G]uidelines need be applied [would be] relatively few. . . [W]e expect shippers to be increasingly able to protect their interests through contracts. Thus, the need for CMP guidelines is expected to decline even further." *Coal Rate Guidelines*, 1 I.C.C.2d at 521-22.
- *Coal Shippers*: "[C]oal shippers and carriers can and do make reasonably accurate assessments of their positions, and likely case outcomes, using the SAC rules and precedents in place today. That is the principal reason why the number of coal rate cases filed at the Board has decreased in recent years. Fewer cases fulfills one of the principle objectives the ICC emphasized when it initially adopted the *Coal Rate Guidelines* in 1985—establishing a set of guidelines that would assist coal shippers and coal railroads in negotiating, rather than litigating, coal rate disputes." *Expediting Rate Cases*, Docket No. Ex Parte 733, Joint Comments of The Western Coal Traffic League et al., at 57-58 (filed Aug. 1, 2016).

Finally, the logic of this "dearth of cases" justification is further undercut by Vice Chairman Miller's comments on the Decision itself. Vice Chairman Miller speculates that the proposal is not expected to result in a large number of cases and that "the Board will rarely be called upon to impose the reciprocal switching remedy." Decision at 33 (Miller, commenting). If this is truly the case, then it is baffling logic for the agency to propose to replace one regime that generated few cases with another regime, also expected to generate few cases, simply because the first generated few cases.

iii. *President Obama's mandate for pro-competitive regulations supports the current Midtec standard.*

Further, the Board wrongly suggests that the proposed rule addresses President Obama's mandate to federal agencies to consider "pro-competitive rulemaking and regulations" and "eliminate[e] regulations that create barriers to or

limit competition." Decision at 9. The "competition" the Board is trying to encourage is completely synthetic and artificial, created by regulatory fiat rather than naturally by market forces. It is not seeking to prevent anticompetitive conduct, as *Midtec* already does, but to instead use Section 11102(c) as a back-door retail rate regulatory scheme, a practice that is clearly unlawful. It is not seeking to promote prudent network rationalization, but instead to facilitate the opening of inefficient routes and interchanges, a situation that throttled the railroad industry before Staggers and made it less competitive with trucking alternatives.

In contrast, the Board's current regulatory regime, which precludes anticompetitive acts, is already pro-competitive and in full compliance with President Obama's mandate. As affirmed in *Midtec*, the current rules were expressly designed to promote competition by "focus[ing] on behavior that is contrary to the competition policies of the Staggers Act or that is otherwise anticompetitive." *Midtec*, 857 F.2d at 1515. Indeed, the ICC itself acknowledged that its interpretation of the reciprocal switching provisions "is in keeping with the rail transportation policy of ensuring effective competition among rail carriers and other modes." *Midtec I*, 1 I.C.C.2d at 367. The current regulations, as interpreted by the ICC and the federal courts, fully address President Obama's mandate.

iv. *There is no evidence that the bar is set too high.*

The final justification offered by the Board is that the current bar for forced access is set too high. The current rules discipline a railroad with a forced access remedy if it abuses its market power by, for example, either (1) providing inadequate service or (2) depriving a shipper of a more efficient route. *Midtec II*, 3 I.C.C.2d at 181. As discussed above, the current rules are consistent with Congress' intent for a narrow use of the forced access remedy, agency precedent exalting

single-line service that engendered extensive industry reliance, and the various studies concluding that the current industry landscape is competitive and efficient.

It is important to emphasize that the Board never explains how it is that this perceived "bar" to a forced access remedy is too high and justifies a wholesale regime change. If a railroad is providing *reasonable* service at *reasonable* rates, over an *efficient* route, what reason could justify a forced access remedy?

The only conceivable reason is a desire by the Board to suppress railroad rates. As explained in more detail in Section IV, that rationale is unlawful. The Board has explained, "the competitive access rules were promulgated not to provide shippers with an alternative form of rate relief." *Entergy Arkansas*, Docket No. 42104 at 15. The D.C. Circuit has similarly rejected the use of forced access as "an alternative means of obtaining rate relief." *Midtec*, 847 F.2d at 1505.[25] And, Congress has rejected requests to transform forced access into an alternative path for rate regulation 18 times.

c. <u>The Board paid no attention to its own commissioned study of access regimes by a group of independent economists.</u>

It is, of course, a hallmark of arbitrary decision-making for an agency to ignore facts or studies that to not conform with the desired approach. In September 2014, the Board commissioned InterVISTAS Consulting LLC "to provide an independent assessment of the Board's SAC rate reasonableness methodology and possible alternatives." Press Release, Surface Transportation Board, STB to Hold Economic Roundtable for Public Discussion of Issues, Conclusions of Independent Study on Rate Case Methodologies (October 12, 2016). In its report, InterVISTAS

[25] *Cf. Union Pac. R.R. Co. v. I.C.C.*, 867 F.2d 646 (D.C. Cir. 1989) (rejecting the use of the Commission's unreasonable practices regulations for a case that arose under the Commission's unreasonable rate jurisdiction).

revealed that its charge from the Board went beyond an assessment of SAC by stating that "the possibility of providing an additional path to potentially lower rates through competitive access motivated a request [by the Board] to expand the study to include an analysis of means for regulating access charges to bottlenecks. . . ." InterVISTAS Report at vi. Thus, one of the objectives of the InterVISTAS Report was to "[d]etermine the applicability of alternative methods of . . . competitive-access pricing that could be used by the STB." *Id.*

Having commissioned this independent economic study, the Board must justify any discrepancies between the conclusions of the Report and any final rule in this proceeding. The InterVISTAS Report, after examining access regimes used in other network industries and in other countries, found that those examples cautioned against an access framework. The Report cited comments from the Australian Productivity Commission warning that "access regimes could undermine economic efficiency and revenue adequacy." *Id.* at 84. The Report also cited recognition from the Federal Energy Regulatory Commission that access regimes have the potential to cause regulated firms "to incur stranded costs." *Id.* at 91.

The Board's proposal released just a few weeks earlier simply cannot be reconciled with these reasoned and substantiated findings by its own independent expert. If the Board ultimately decides to issue a final rule in this proceeding, such final rule must not ignore the conclusions of the InterVISTAS Report.

* * *

In sum, the Board has offered no adequate justification for departing from longstanding agency precedent, especially given the significant industry reliance engendered by this precedent and the most recent recommendations in the InterVISTAS Report against using forced access as an alternative to rate regulation.

IV. The Proposed Regime Change Is Unlawful.

Even if the Board had provided an explanation for its departure from precedent and reversal of sound regulatory policies, such explanation could not suffice because what the STB proposes is unlawful and must be withdrawn.

a. The Board cannot use forced access as backdoor rate regulation.

In interpreting Section 11102(c), the Board "must, as usual, 'interpret the relevant words not in a vacuum, but with reference to the statutory context.'" *Torres v. Lynch*, 136 S. Ct. 1619, 1626 (2016); *see also, e.g.*, *Abramski v. United States*, 134 S. Ct. 2259, 2267 (2014); *FDA v. Brown & Williamson Tobacco Corp.*, 529 U.S. 120, 132-33 (2000); *American Coal Co. v. Fed. Mine Safety & Health Review Comm'n*, 796 F.3d 18, 23 (D.C. Cir. 2015). Applying that standard, the Board's proposal is clearly unlawful, because it attempts to use required forced access as a way of lowering the rates shippers pay—ignoring the ICC Termination Act's ("ICCTA") existing provisions regarding rate regulation.

The Decision makes clear that under the proposed rule, forced reciprocal switching would be used as an alternative to rate regulation. For example, in describing the "necessary to provide competitive rail service" prong of Section 11102(c), the Decision states:

> The purpose of ordering reciprocal switching under this prong is to encourage competition between two carriers. As such, a shipper would have the choice between using the incumbent carrier or the competing carrier depending on which one provided the *better rates* or service.

Decision at 27 (emphasis added). And the InterVISTAS Report confirmed the Board's "[o]ngoing interest in the possibility of providing an additional path to potentially *lower rates* through competitive access motivated a request [by the

Board] to expand the study to include an analysis of means for regulating access charges to bottlenecks. . . ." InterVISTAS Report at vi (emphasis added).

With Staggers and ICCTA, Congress put in place an elaborate statutory structure that included specific provisions to protect shippers from unreasonable rates while allowing railroads to engage in differential pricing to recover joint and common network costs. *See, e.g., Atchison, Topeka & Santa Fe Ry. v. ICC*, 580 F.2d 623, 628 (D.C. Cir. 1978) (noting "Congress's concern that the needs of the railroads for economic revitalization be balanced against the interests of shippers and the public"). Key features of the elaborate statutory structure include:

- Limited agency jurisdiction unless the railroad has "market dominance." 49 U.S.C. §§ 10701(a), (d)(1), 10707(a);
- No presumption of unreasonable rates even where there is a lack of effective competition. *Id.* at § 10707(c).
- Specific "Long-Cannon" factors to be considered. *Id.* at § 10701(d)(1)-(2).
- A requirement for the agency to consider the national policy requiring that railroads shall earn adequate revenues. *Id.* at § 10701(d).
- A requirement for the agency to establish a simplified procedure, consistent with sound economic principles, where the value of the case cannot justify the cost of a full SAC presentation. *Id.* at § 10701(d)(3). *See also* S. REP. NO 104-176, at 5 (1995).
- Specific deadlines for different rate reasonableness procedures. 49 U.S.C. § 10704.

The Board's proposed rule provides shippers with relief under Section 11102(c) whenever they feel their rates are too high. Both the agency and the courts, however, have expressly held that the forced access provisions of ICCTA cannot be used as an alternative to rate regulation; and Congress similarly has never authorized the use of forced access provisions as an alternative to rate regulation.

More than 30 years ago, the ICC rejected a request for forced access relief because the shipper's sole complaint was that the existing rail rate was too high: "When one shipper is seeking joint use of terminal facilities or reciprocal switching, a mere preference for the opportunity to obtain lower rates is not sufficient." *Midtec I*, 1 I.C.C.2d at 365. Similarly, less than a year after it was created by ICCTA, the Board held that the "competitive access rules were promulgated not to provide shippers with an alternative form of rate relief, . . . but to offer a competitive remedy where a bottleneck carrier has exploited its market power." *Central Power & Light Co. v. Southern Pac. Trans. Co.*, 1 S.T.B. 1059, 1068 (1996).

The courts have also recognized that Section 11102(c) and the "reasonable practices" provisions of ICCTA cannot be used as a vehicle to circumvent the statute's elaborate rate reasonableness framework. In *Midtec*, the D.C. Circuit, consistent with the concept of differential pricing, rejected the notion "that section 11103 was intended to be an alternative means of obtaining rate relief, requiring the Commission affirmatively to move the national rail system toward a regime more like perfect competition, with the attendant benefits of marginal cost ratemaking." 857 F.2d at 1505. That court made clear that "[i]f the Commission were authorized, as Midtec's argument entails, to prescribe reciprocal switching or terminal trackage whenever such an order could enhance competition between rail carriers, it could radically restructure the railroad industry. We have not found even the slightest indication that Congress intended the Commission in this way to conform the industry more closely to a model of perfect competition." *Id.*

One year later, in *Union Pacific Railroad Company v. Interstate Commerce Commission*, the court reiterated that the rate reasonableness provisions of ICCTA are the only avenue that shippers may use to challenge rates as unreasonably high. The D.C. Circuit held that the ICC had erred in treating a challenge to rail carriers'

rates for the transportation of spent nuclear fuel and other radioactive materials as an "unreasonable practice" proceeding under then-extant 49 U.S.C. Section 10701, rather than as a rate proceeding, because "the so-called 'practice' is manifested exclusively in the level of rates that customers are charged." 867 F.2d at 649 (emphasis in original). The court explained:

> Although the ICC insists that its decision is predicated on a finding of an unreasonable practice, its analysis has all the earmarks of a rate proceeding: the Commission's analysis is largely focused on the reasonableness of the added costs on which the railroads' rates are predicated, it makes the requisite finding of market dominance, and the remedies it awards consist of rate relief in the form of prescribed rates and rebates.

Id. at 649.

Moreover, Congress has never suggested the agency is authorized to use Section 11102(c) to circumvent the rate reasonableness apparatus in the statute. Just the opposite. When Congress had concerns about unreasonable rates, it directed its attention specifically to the agency's rate regulations. For example, with ICCTA Congress directed the STB to create simplified rate standards where the value of a case could not justify a full-SAC analysis. And only last December, Congress addressed shippers' concerns that rate reasonableness proceedings were expensive and burdensome by enacting the Surface Transportation Board Reauthorization Act of 2015, Pub. L. No. 114-110, 129 Stat. 1228 ("STBRA"). Likewise, the Senate report on STBRA stated that the bill was intended to "improve review processes," to ensure that the Board "maintain[s] one or more streamlined processes for rate cases in which the stand-alone cost presentation is too costly," and to "increase the efficiency of dispute resolution." S. REP. NO. 114-52, at 7. Thus, there is no hint in STBRA, either in the enacted legislation or the legislative

history, that Congress was authorizing the Board to circumvent the rate reasonableness provisions of ICCTA by using the forced access provisions in Section 11102(c). And as stated above, Congress has explicitly rejected shippers' requests to transform forced access into an alternative pathway to lower rates a whopping 18 times. Thus, Congress' intent to keep forced access separate from rate regulation is clear.

Indeed, "Congress . . . does not alter the fundamental details of a regulatory scheme in vague terms or ancillary provisions—it does not, one might say, hide elephants in mouseholes." *Whitman v. American Trucking Assoc. Inc.*, 531 U.S. 457, 468 (2001). The Board's apparent belief that the ancillary "mousehole" of Section 11102(c) contains a hidden "elephant" of an alternative path to lower rates simply cannot be reconciled with the elaborate and distinct statutory framework adopted by Congress to govern rate regulation, with its standards, deadlines, limitations, and balanced policy features. Nor can it be reconciled with Congress' repeated actions to address shippers' concerns regarding the accessibility of rate relief by focusing only on revisions to this distinct statutory framework and to reject shippers' requests to liberally transform forced access into rate regulation. "Congress chose the present system. And until Congress changes the statute, the agency and the courts must abide by it." *Southwestern Bell Corp. v. FCC*, 43 F.3d 1515, 1524 (D.C. Cir. 1994).

In sum, the proper avenue of redress for customers' rate concerns is a rate case. The Board has three procedures that allow shippers to seek rate relief—the Stand-Alone Cost ("SAC") methodology, Simplified SAC, and Three Benchmark. And, these three procedures are sufficient and cost-effective for shippers of all sizes and all commodities. *See* InterVISTAS Report at 22, 45, 130 ("The research has not pointed to a simpler methodology than the three CMP methods that asses rate

reasonableness consistent with the statutory requirement to take into account carrier revenue adequacy and encourage achievement of the highest possible level of economic efficiency/economic welfare.").

b. The Board's proposed modification of the "practicable and in the public interest" prong of Section 11102(c) is contrary to congressional intent.

In enacting the reciprocal switching provisions of Section 11102(c), Congress adopted the same "practicable and in the public interest" standard that the ICC used to require a rail carrier to allow another carrier to use its terminal facilities. H.R. REP. NO. 96-1035, at 67 (1980). The standard requires that "some actual necessity or some compelling reason must first be shown before [it] can find such action in the public interest." *Central States Enterprises, Inc. v. ICC*, 780 F.2d 664, 678 (7th Cir. 1986) ("*Central States*"); *see also Jamestown, N.Y. Chamber of Commerce v. Jamestown, Westfield & Northwestern R.R. Co.*, 195 I.C.C. 289, 292 (1933) ("*Jamestown*"); *Central States Enterprises v. Seaboard Coast Line R.R. Co.*, ICC Docket No. 38891, 1984 ICC LEXIS 479, at *5 (1984) (refusing to require reciprocal switching because "the [incumbent carriers'] service . . . has not been shown to be inadequate"). The "compelling need" test, in turn, requires a showing that "shippers are so inadequately served at the present time as to warrant" that the railroad share its terminal facilities. *Jamestown*, 195 I.C.C. at 292. "The expression 'in the public interest' means more than a mere desire on the part of shippers or other interested parties for something that would be convenient or desirable to them." *Id.*

In *Central States*, the Seventh Circuit agreed that before the agency may require reciprocal switching, the party seeking such switching must show that the existing service is inadequate. The court described the legislative history of Section 11102(c) and concluded that "in enacting subsection (c), Congress attempted

to increase competition 'in areas where reciprocal switching is feasible ...' and where the switching agreement would provide an avenue of relief for shippers *where only one railroad provides service and it's inadequate.*" *Central States*, 780 F.2d at 669 (emphasis added).

The joint brief filed by the United States and the ICC in *Central States* mirrored the court's eventual holding. The Government referred the court to the Conference Report on the Staggers Act, which noted that the statute provided relief for shippers "where only one railroad provides service and it is inadequate." Joint Brief of the Interstate Commerce Commission and the United States of America filed Nov. 15, 1984 in No. 84-2005, *Central States v. ICC* (7th Cir.), at 37. The Government advised the Seventh Circuit that "the need to show inadequacy of service as a prerequisite for a[n] award of either joint terminal use or reciprocal switching is *dictated by the legislative history of Section 11101(a)* [now Section 11102(a)] and precedent." *Id. at* 37 n.31 (emphasis added).

The Board is not writing on a clean slate. It cannot ignore a century of precedent defining the meaning of "public interest" in this context. Congress ordered the ICC to use the same standard for "public interest" required for forced trackage rights, a standard that demanded a showing of compelling need due to inadequate service as a pre-requisite before forcing the incumbent carrier to forego its right to the long haul. Yet the Decision would force switching under the "practicable and in the public interest" prong any time the agency finds that the potential benefits from the proposed switching arrangement outweigh the potential detriments, regardless of whether the incumbent carrier already provides adequate service. *See* Decision at 41 (proposed 49 C.F.R. § 1145.2(a)(1)(iii)). Such an approach would be contrary to the express intent of Congress.

c. The Board's new-found interpretation of the "necessary to provide competitive rail service" prong of Section 11102(c) does not withstand scrutiny.

For the last 30 years, the ICC and the Board have ruled that switching is "necessary to provide competitive rail service" when the railroad has market power and is abusing that power to deprive a shipper of a more efficient alternative route. *See, e.g., Entergy Arkansas,* Docket No. 42104 at 8; *Midtec II,* 3 I.C.C.2d at 176, 181; 49 C.F.R. § 1144.2(a)(1); *see also* Decision at 3-4, 15-16. Now, however, the Board has performed an about-face and proposes that switching is "necessary" for "competitive" rail service simply if "intermodal and intramodal competition is not effective." Decision at 19.[26]

The Board's new-found interpretation is contrary to the plain language of the statute, to its own prior interpretation of the statutory language, and to reason. First, the proposed standard is inconsistent with ICCTA, which flatly prohibits any presumption of railroad misconduct from the bare fact that a railroad has market dominance over the transportation at issue. *See* 49 U.S.C. § 10707(c) (finding of market dominance does not establish a presumption that the proposed rate is unreasonably high). Thus, the Board cannot assume that the coercive remedy of forced reciprocal switching is "necessary to provide competitive rail service" based solely on a finding that a railroad has market dominance, because the Board would be assuming that the rate is unreasonably high—which it may not do. Indeed, if the incumbent's single-line route is efficient, the reciprocal switching remedy is unnecessary and unlawful because the rate reasonableness procedures of ICCTA will assure that the shipper has a remedy if its rate is unreasonable.

[26] Although the Board would also require the requesting shipper to show that the facilities in question are served by a Class I railroad and that there is or can be a working interchange between the Class I carrier servicing the shipper (Decision at 19), these criteria have nothing to do with competition.

Second, the Board's proposal is fatally flawed because its own use of the term "necessary for competitive rail service" is internally inconsistent. On the one hand, the Board is proposing that forced access is necessary for "competitive rail service" if the incumbent Class I carrier has market dominance, without any showing of anticompetitive conduct. Decision at 19. On the other hand, the Board states that forced access will not necessarily provide for effective competition in rate reasonableness proceedings. *Id.* at 22-23. The Board's proposed interpretation, therefore, amounts to the illogical proposition that the Board will require reciprocal switching if it finds that no effective intramodal or intermodal competition exists—but once such switching is required, the Board will not assume that effective competition exists in determining whether a railroad has market dominance, and the Board will therefore continue to regulate the incumbent carrier's rate from origin to destination. Under this line of reasoning, "competitive rail service" is not "effective competition."

Quite simply, Section 11102(c) does not permit the Board to have it both ways —letting shippers have their cake and eat it too. Forced access cannot be found, by legislative rule, to be both necessary for competitive rail service and yet not provide competitive rail service. The Board's inconsistent interpretation is therefore unlawful. *See, e.g., Business Roundtable v. SEC*, 647 F.3d 1144, 1153 (D.C. Cir. 2011) (internally inconsistent agency action is inherently arbitrary under the APA); *Tarrant Regional Water Dist. v. Herrmann,* 133 S. Ct. 2120, 2133 (2013) (rejecting petitioner's interpretation because petitioner "cannot have it both ways").[27]

---

[27] *See also University Hospitals of Cleveland v. Edison Elec. Co.,* 202 F.3d 839, 849 (6th Cir. 2000) (rejecting interpretation of benefit plan because if court accepted it, it "would sanction an inconsistent reading and permit the Plan to have it both ways"); *Gen. Chem. Corp. v. United States,* 817 F.2d 844, 857 (D.C. Cir. 1987) (setting aside ICC's decision because it was "internally inconsistent").

The existing interpretation of the "necessary to provide competitive rail service" prong of Section 11102(c) is, in contrast, very logical. The agency concluded that Congress intended the Board to encourage switching when a carrier has abused its market power to deprive a customer of access to a more efficient route. This interpretation follows the ordinary meaning of "competitive," meaning a service that is "as good as or better than others of a comparable nature." Oxford Dictionary of English 335 (3d Rev. Ed. 2010). As the Commission has previously observed and the Board does not distinguish, "it is not the number of routes alone that constitutes competition, but also the competitiveness of the alternatives."[28]

Third, the Board's apparent belief that Congress intended the agency to force switching anywhere there is a lack of effective competition—without any showing of whether the alternative is more efficient—conflicts with the core framework of the Staggers Act.

One of the primary goals of Staggers was to lift the cumbersome ICC regime of forcing carriers to maintain inefficient joint routes. *See, e.g.*, 49 U.S.C. § 10101(3), (4), (8) (Rail Transportation Policy seeks to "promote a safe and efficient rail transportation system," "ensure the development and continuation of a sound rail transportation system," and "encourage honest and efficient management of railroads"); *Ill. Commerce Comm'n v. ICC*, 749 F.2d 875, 877 n.2 (D.C. Cir. 1984) (Staggers Act sought to replace the old regulatory framework, which was "antiquated and inefficient"). The Conference Report on the Staggers Act stated: "Two of the major problems caused by the existing joint rate systems are too few low rate divisions and a proliferation of uneconomic routes protected by the archaic 'commercial closing' doctrine." H.R. REP. NO. 96-1430, at 111 (1980). Given this

---

[28] Docket No. Ex Parte 445, *Standards For Intramodal Rail Competition: Denial of Petition For Rulemaking*, 48 Fed. Reg. 31672, 31674-31675 (1983).

history, it is inconceivable that Congress was simultaneously empowering the ICC to force access to a less-efficient alternative.[29]

Indeed, the ICC consistently refused to find that the closure of inefficient joint routes was contrary to the public interest. For example, shortly after passage of the Staggers Act, the ICC discontinued its prior practice of imposing the so-called "DT&I Conditions" in connection with its approval of railroad consolidations. *Traffic Protective Conditions*, 366 I.C.C. at 112. In doing so, the ICC found that the DT&I conditions—which, among other things, required railroads to maintain all existing routes and points of interchange with connecting carriers—undermined the efficiency of the rail network because "[t]he Conditions hamper carrier efforts to rationalize their systems by freezing existing junctions and interchanges." *Id.* at 114. In addition to discarding the DT&I Conditions, the ICC actively allowed carriers to rationalize their systems. In *Guilford Transportation Industries, Inc. – Control – Boston and Maine Corporation*, the Commission rejected arguments against the closure of a joint route, noting that "[w]e do not agree that in every instance the closure of such a joint route would be contrary to the public interest." 5 I.C.C.2d 202, 208 (1988). And the Commission has long acknowledged that "routing inefficiency harms carriers as well as shippers and harms the public interest generally." *Conrail – Exemption – Abandonment of the Weirton Secondary Track in Harrison and Tuscarawas Counties, OH*, Docket No. AB-167 (Sub-No. 1088X) at 8 (ICC served June 14, 1989).

---

[29] The House report on the legislation similarly cited the need to eliminate inefficient joint routes. *See* H.R. REP. NO. 96-1035, at 121 (1980) ("The tangled web of railroad prices becomes a multi-layer of tangled webs because, once in place, joint rates become virtually immune to selective or individual changes. . . . In short, the rate procedure itself, rather than the marketplace, controls the price decisions, even if circuitous routes result, eroding efficiency").

Moreover, in numerous merger decisions, the Commission encouraged the development of single-line service. Among other efficiencies of single-line service, the agency has repeatedly recognized the benefits—for carriers and shippers alike—of reducing the number of shipments that must be interlined between railroads. For example in *Burlington Northern, Inc. – Control and Merger – St. Louis-San Francisco Ry. Co.*, 360 I.C.C. 788, 940 (1980), the ICC observed:

> Interchanging traffic adds to the total cost of handling traffic, including operational cost (car-switching) and clerical costs (recordkeeping). Interchanging freight also adds significantly to delivery time, since the time a railcar spends in a yard or terminal is most of its time in transit and an inefficient use of cars.

And when approving the transaction that created CSXT, the ICC stated:

> The consolidation of interchange partners should provide faster, more efficient service to a wider geographic area, to the public benefit . . . . It is generally thought that single-line service has many advantages over joint-line service for both shippers and carriers. Interchange operations can be eliminated, reducing both operating and overhead costs and transit time; transaction costs are reduced; and incentives to provide less than efficient service (arising from per diem charges for railcars, rate divisions, or production externalities) are reduced. Thus, speed, reliability, and handling are enhanced.

CSX Corp. – Control – Chessie System, Inc. & Seaboard Coast Line Indus. Inc., 363 I.C.C. 521, 552-53 (1980). And, of course, the STB noted that the public interest benefited from the Conrail Transaction because of expanded single line service. *CSX Corp. and CSX Transp., Inc., Norfolk Southern Corp. and Norfolk Southern Ry. Co. – Control and Operating Leases/Agreements – Conrail Inc. and Consolidated Rail Corp.*, STB Docket No. FD 33388, 1998 STB LEXIS 1549, at *93 (served May 22, 1998) ("Single-line service permits greater flexibility to freely

change train priorities in reaction to market demands without the need to coordinate with other railroads, such as a terminal operator located in the middle of the route."). The Board's proposal would reverse this longstanding policy, granting itself broad discretion to compel a railroad to enter into a switching agreement without even a minimal or superficial analysis of efficiency considerations.

Finally, this illogical interpretation of "necessary for competitive rail service" is the polar opposite of the contemporaneous interpretations by the United States Department of Justice ("DOJ") and the ICC, finding that Congress intended forced access to a *more efficient* route to be a *prerequisite* for relief under this second prong. One year following the enactment of Staggers, the ICC rejected the concerns of shippers that routing would be limited if carriers that are participants in particular routes price separately, rather than through a joint rate:

> [W]e can see no harm to the carriers or the shipping public in reducing the number of routes. . . . To the extent that our definition ... will result in the loss of some routes . . . that effect is outweighed by the desirability of more efficient routing. . . . The elimination of costly, circuitous and inefficient routes will benefit the industry as well as its customers.

Western Railroads Agreement, 364 I.C.C. 635, 649 (1981). In 1982, the ICC found that interchange costs related to interlining may outweigh costs associated with greater circuity, and therefore, that a longer, single-line route was not necessarily unlawful. *Traffic Protective Conditions*, 366 I.C.C. at 124-25.

The DOJ also recognized in the early 1980's that Congress intended that reciprocal switching should be required by the ICC only when the shipper shows that such switching would give it access to a more efficient route. In its brief defending the forced access rules in *Intramodal Rail Competition*, the DOJ stated:

- "[T]he railroad industry cannot afford to shoulder the costly burden of inefficient routes simply to protect individual carriers. . . . The primary purpose of joint rate regulation under the revised Interstate Commerce Act is to prevent the closing of through routes that are necessary for efficient service to the public." Joint Brief For the Interstate Commerce Commission and United States of America filed June 1986 in *Balt. Gas & Elec. Co. v. United States*, at 13.

- *BG&E's* interpretation of the competitive access provisions of the Staggers Act "in a nutshell, involves using the Commission's coercive power to effect direct head-to-head competition among railroads to the maximum extent possible, regardless of other competitive forces and without more than a minimal or superficial analysis of efficiency considerations. We submit that this is neither a necessary nor an appropriate reading of legislative intent.'" *Id.* at 44.

The Board cannot now inexplicably read analysis of efficiency considerations entirely out of Section 11102(c) and hand out forced switching remedies based solely on a showing of market dominance, overturning the entire structure and thrust of Staggers.

d. The proposed rule is unlawful because it would permit the Board to order reciprocal switching to an interchange located outside of a terminal area.

The proposed rule is not limited to the switching of rail cars between carriers within a terminal area. Instead, the Board proposes to allow a shipper to obtain an order of reciprocal switching if the shipper's facility is "within a reasonable distance" of what "is or can be a working interchange." *See* Decision at 18-19, 21; proposed 49 C.F.R. §§ 1145.2(a)(1)(ii), 1145.2 (a)(2)(iii). This proposed expansion of the Board's powers, however, is unlawful, because Congress did not authorize the Board to order reciprocal switching in interchanges beyond a terminal area.

First, plain language in Section 11102 evidences that Congress did not give the Board such authority. In Section 11102(a), Congress gave the Board the authority to order one carrier to allow another carrier to use its "terminal facilities,

including mainline tracks for a reasonable distance outside a terminal." 49 U.S.C. § 11102(a). By contrast, Section 11102(c) does not authorize the Board to order reciprocal switching for a "reasonable distance outside the terminal." Instead, Section 11102(c) only authorizes the Board to "require rail carriers to enter into reciprocal switching agreements" if certain findings are made. *Id.* at § 11102(c).

The omission of the "reasonable distance" language from Section 11102(c) cannot reasonably be interpreted as inadvertent. Where Congress includes particular language in one section of a statute, but omits it in another section of the same act, it is generally presumed that Congress acts intentionally and purposely in the disparate inclusion or exclusion." *Russello v. United States*, 464 U.S. 16, 23 (1983).[30] Furthermore, the Board offers no evidence that Congress intended to include such language (even by implication) in Section 11102(c). In fact, the Board gives no explanation for its interpretation at all. Decision at 21. "Had Congress intended to [include such language], it presumably would have done so expressly as it did in" Section 11102(a). *Russello*, 464 U.S. at 23.

Second, interpreting Section 11102(c) to include the "reasonable distance" language would be at odds with the well-established meaning of reciprocal switching at the time this term was inserted into the statute. "Reciprocal switching" is activity that necessarily occurs only in a terminal area. That definition of the term was well-accepted in the industry at the time Congress enacted the reciprocal switching provision in the Staggers Act. As the ICC explained 45 years ago:

---

[30] *See also, e.g., Nat'l Fed. Of Ind. Business v. Sebelius*, 132 S. Ct. 2566, 2583 (2012); *Pacific Operators Offshore, Ltd. v. Valladolid*, 565 U.S. 207, 216 (2012); *Dean v. United States*, 556 U.S. 568, 573 (2009).

> It has long been a common practice among the railroads to participate *at commonly served terminal areas* in what is called reciprocal switching. In practice this means that one line-haul carrier operating within the terminal area will act only as a switching carrier in placing cars at industries on its own trackage for loading or unloading, as an incident of the line-haul movement of those cars over another carrier whose trackage in that terminal area does not extend to the serviced industry.

Switching Charges and Absorption Thereof at Shreveport, LA, 339 I.C.C. 65, 70 (1971) (emphasis added).

That is the way the ICC interpreted Section 11102(c). In the *Central States* proceeding, which was decided after Section 11102(c) was enacted, the ICC stated: "Reciprocal switching occurs at stations or terminals served by more than one carrier. A common station or terminal area is, therefore, a prerequisite for such switching." *Central States Enterprises, Inc. v. Seaboard Coast Line R.R. Co.*, 1984 ICC LEXIS 499, at *6 (1984). That definition was quoted approvingly by the Seventh Circuit in the appeal of the ICC's decision. *See Central States,* 780 F.2d at 675. The court affirmed the ICC's denial of a request for mandated reciprocal switching on the ground that the shipper sought to "extend reciprocal switching arrangements at a common station ... to a local station outside the existing switching limits of that station." *See* 1984 ICC LEXIS 499, at *7; *Central States,* 780 F.2d at 674-80.

Finally, an expansive reading of Section 11102(c) to permit the Board to force a carrier to forego a long haul so long as there is a working interchange within a "reasonable distance" of the terminal turns reciprocal switching into an alternative through route. The statutory protection of the railroads' right to the long-haul was established more than a century ago by the Mann-Elkins Act of 1910. *See* 36 Stat. 539, 552. The protection of the long haul is now codified at 49 U.S.C. Section

10705(a)(2) and has been repeatedly upheld by the agency and the Supreme Court. *See, e.g., United States v. Mo. Pac. R.R.*, 278 U.S. 269, 276-82 (1929) (holding that the purpose of the statutory limit on the ICC's power to prescribe through routes "is to protect the long haul routes of carriers"); *Chicago, Milwaukee, St. Paul & Pac. R.R. Co. v. United States*, 366 U.S. 745, 749 (1961) (requiring that the ICC "shall not . . . require any carrier . . . to embrace in such [a through] route substantially less than the entire length of its railroad"). The STB itself has acknowledged the right of the originating carrier "to maximize its long-haul." *Central Power & Light Co. v. S. Pac. Transp. Co.*, 2 S.T.B. 235, 243 (1997). The agency is impermissibly blurring the distinction between Section 11102(c) and Section 10705 by employing phantom language of its own creation.

e. Congress has repeatedly ratified the existing regulatory regime.

As Norfolk Southern has previously shown, Congress has ratified the Board's standard that requires a finding of competitive abuse before forced access will be required under 49 U.S.C. Section 11102(c). *See Petition for Rulemaking to Adopt Revised Competitive Switching Rules*, STB Docket No. Ex Parte 711, Opening Comments of Norfolk Southern Ry. Co. at 23-28 (filed Mar. 1, 2013) ("NS EP 711 Opening Comments"). In the Decision, however, the Board concluded that the ratification doctrine was "inapplicable here," because Norfolk Southern and CSX had not "cite[d] any legislative history in which Congress even mentioned the agency's interpretation of former § 11103 (now § 11102), much less voiced approval for it." Decision at 11-12.[31]

[31] The Board also found that the ratification doctrine was inapplicable because of its "broad discretion and the potential for varying, reasonable interpretations of § 11102." Decision at 12. Even when an agency has the discretion to choose between equally reasonable interpretations of a statute, however, the doctrine of ratification applies where, as here, the agency's original interpretation is longstanding and Congress (1) was aware of that interpretation but subsequently amended the statute without changing that interpretation, (2) repeatedly rejected pleas to adopt a

The Board's conclusion is baffling, as it flatly ignores the record in Ex Parte 711. *See* NS EP 711 Opening Comments at 23-28; *Petition for Rulemaking to Adopt Revised Competitive Switching Rules*, STB Docket No. Ex Parte 711, Opening Comments of CSXT Transp. Inc at 11-21 (filed Mar 1. 2013). As Norfolk Southern and CSXT demonstrated, Congress has indeed been aware of the ICC's interpretation of Section 11102(c) since *Midtec*, and subsequently re-enacted the statute using "existing standards." H.R. REP. NO. 104-311, at 84, reprinted in 1995 U.S.S.C.A.N. 793, 796 (1995). As the Board failed to address the evidence previously submitted in Ex Parte Nos. 711 and 705, Norfolk Southern will renew its submission in this docket.

Since the passage of the Staggers Act, Congress re-enacted the forced access provisions of the Act in 1995 as part of ICCTA without revising the approach taken by the ICC in *Intramodal Rail Competition* and *Midtec*. Those re-enactments affirmatively ratified *Midtec*. "Congress is presumed to be aware of an administrative or judicial interpretation of a statute and to adopt that interpretation when it reenacts a statute without change." *Forest Grove School Dist. v. T.A.*, 557 U.S. 230, 239-40 (2009); *Lindahl v. Office of Pers. Mgmt.*, 470 U.S. 768, 782 n.15 (1985); *see also, e.g., Federal Deposit Ins. Corp. v. Philadelphia Gear Corp.*, 476 U.S. 426, 437 (1986) ("When the statute giving rise to the longstanding interpretation has been reenacted without pertinent change, the 'congressional failure to revise or repeal the agency's interpretation is persuasive evidence that the interpretation is the one intended by Congress.'") (quoting *NLRB v. Bell Aerospace,*

---

different interpretation, and (3) affirmatively intended to adopt the agency's "well established interpretation of that provision." *Ass'n of American Railroads v. ICC,* 564 F.2d 486, 494 (D.C. Cir. 1977).

416 U.S. 267, 275 (1974)); *Zemel v. Rusk*, 381 U.S. 1, 11-12 (1964); *United States v. G. Falk & Brothers*, 204 U.S. 143, 151 (1907).

Congress was fully aware both of the ICC's interpretation of its forced access authority—which was consistent with precedent back to the *Jamestown* decision in 1933—and of the arguments of shippers seeking to lower the bar for obtaining an ICC order for forced access and forced interchange. Indeed, there were numerous congressional hearings on the topic prior to the adoption of ICCTA.[32] With that knowledge, Congress chose to re-enact the reciprocal switching and terminal access provisions of the Interstate Commerce Act ("ICA"), and transferred reciprocal switching jurisdiction to the Board, without making substantive changes to "existing standards." H.R. REP. NO. 104-311, at 84, reprinted in 1995 U.S.S.C.A.N. 793, 796 (1995) (ICC's functions, including "terminal trackage rights and reciprocal switching jurisdiction," would be "transferred to the [successor agency] under existing standards with minor modifications for large Class I railroads' transactions").[33] In doing so, Congress made clear that it approved of and did not intend to alter the ICC's post-Staggers approach to economic regulation, including its forced interchange and forced access standards and approach:

---

[32] It is worth noting that calls for Congress to amend the ICA to "encourag[e] the use of reciprocal switching" were made for more than a decade before ICCTA. *See, e.g., Oversight of the Staggers Rail Act of 1980*: Hearings Before the Subcomm. on Surface Transportation of the S. Comm. on Commerce, Science, and Transportation, 98th Cong. ("Staggers Oversight Hearings") at 55160 (statement of Chemical Manufacturers Association proposing legislation "to promote rail-to-rail competition" by requiring reciprocal switching on request); *see also id.*, at 231-35 (comments of shipper coalition, the "Procompetitive Rail Steering Committee," calling for Congress to enact "clarifying legislation" to promote competitive access policies that would allow a shipper to "have access to as many railroads as can practically compete for his business"); *id.* at 336 (NITL statement encouraging Congress to take "remedial actions" to "[f]oster[] rail-to-rail competition").

[33] *See also* H.R. REP. NO. 104-311, at 105 (ICCTA "retains the existing agency power to order access to terminal facilities"); H.R. REP. NO. 104-422, at 184, reprinted in 1995 U.S.S.C.A.N. 850, 869 (Conf. Rep.) ("Under the amended section 11102, the agency's existing power to order access to terminal facilities, including main-line tracks a reasonable distance from the terminal, would be retained").

> Beyond weeding out outdated and unnecessary provisions, the bill generally does not attempt to substantively redesign rail regulation. Rather, it would preserve the careful balance put in place by the 4R Act and the Staggers Act that led to a dramatic revitalization of the rail industry while protecting significant shipper and national interests.

S. REP. NO. 104-176, at 6 (1995). Indeed, the Senate Report explicitly rejected calls for further regulation of issues such as "market access":

> The Committee recognizes that certain affected shipper groups—most notably smaller shippers and smaller railroads—believe that further legislative changes are necessary or desirable to more fully protect their interests. However, the Committee is concerned that such additional measures would necessarily cast an overly broad regulatory net and even then might be ineffective to solve the underlying concerns (e.g., car supply, market access, etc.).

Id., at 9-10.

Congress' revisions to the ICA following the enactment of the Staggers Act are further proof that it ratified the Board's "anticompetitive conduct" standard. When Congress passed ICCTA and STBRA, it was well aware of *Midtec* and the ICC/STB's interpretation of its forced access and forced interchange authority. Congress was equally well-informed of the fact that some shippers believed that *Midtec* should be reversed. *Competition in the Railroad Industry*, STB Docket No. Ex Parte 705, Opening Comments of Norfolk Southern Ry. Co. at 15-20 (filed April 12, 2011). Nonetheless, with that knowledge, Congress chose to re-adopt the access provisions of the ICA in ICCTA without altering the ICC's preexisting interpretation.

By contrast, ICCTA amended the rate regulation provisions of the ICA to make the rate regulation process more available to shippers. For example, in

Section 10701(d)(3) ICCTA required that within one year of its effective date, the Board complete its then-pending proceeding to establish non-coal simplified rate guidelines for determining the reasonableness of rates in cases where a full stand-alone cost presentation is too costly. *See* 49 U.S.C. § 10701(d)(3). Moreover, as described above, in STBRA, Congress amended the rate reasonableness provisions of ICCTA to expedite rate reasonableness cases and mandate the preservation of simplified methodologies, without changing the Board's forced access standards.

Furthermore, nothing in ICCTA or STBRA suggests that Congress intended the Board to use its forced access rules as an alternative to direct rate regulation. Indeed, the fact that Congress extensively amended the provisions regarding rate reasonableness proceedings following the Staggers Act without changing Section 11102(c) suggests precisely the opposite: Congress, aware of the *Midtec* approach to regulating "market access," ratified that approach. Consequently, only Congress may change that law. *See, e.g.*, *Lindahl*, 470 U.S. at 783 n.15 ("When the statute giving rise to the longstanding interpretation has been reenacted without pertinent change, the 'congressional failure to revise or repeal the agency's interpretation is persuasive evidence that the interpretation is the one intended by Congress.'").

In addition, the absence of any action by Congress expressly to alter the *Midtec* decision is powerful evidence that Congress has ratified the Board's current rules, despite abundant opportunities to depart from or reverse such rules over the last 30 years. Congress repeatedly has rejected proposed legislation that would essentially overturn *Midtec*. Over the past fourteen years, at least 18 bills have been introduced in the House or Senate that would relax the *Midtec* standard and

make it easier for shippers to obtain an order to force reciprocal switching or terminal access.[34] Not one of those 18 bills passed either house of Congress.

The purposes and intended effects of all of these unsuccessful bills were well-known. Sponsors and congressional hearings made clear that these bills were intended, *inter alia*, to repeal the *Midtec* standards.[35] As the Supreme Court

---

[34] *See, e.g.*, (1) Rail Shipper Fairness Act of 2015, S. 853, 114th Cong., § 3 (2015) (requiring rail carriers to quote rates between any interchange points of two or more carriers and requiring competitive switching in terminal areas or within 100 miles of an interchange unless infeasible or unsafe); (2) Surface Transportation Board Reauthorization Act of 2011, S. 158, 112th Cong., § 302 (2011) (overturning *Midtec*, establishing when STB should provide terminal access, and create a pricing mechanism); (3) Surface Transportation Board Reauthorization Act of 2009, S. 2889, 111th Cong., § 302 (2009) (same as S. 158); (4) Railroad Competition and Service Improvement Act of 2007, S. 953, 110th Cong., § 104 (2007) (requiring, rather than authorizing, STB to order reciprocal switching); (5) Railroad Competition and Service Improvement Act of 2007, H.R. 2125, 110th Cong., § 104 (2007) (same); (6) Railroad Competition Improvement and Reauthorization Act of 2005, H.R. 2047, 109th Cong., § 5 (reversing *Midtec* by prohibiting Board from requiring evidence of anticompetitive conduct as condition to ordering reciprocal switching); (7) Railroad Competition Act of 2006, S. 2921, 109th Cong., § 104 (2006) (reversing *Midtec* by amending statute to read "the Board shall not require evidence of anticompetitive conduct by a rail carrier from which access is sought" as condition to terminal access or reciprocal switching); (8) Railroad Competition Act of 2005, S. 919, 109th Cong., § 102 (2005) (prohibiting Board from requiring evidence of anticompetitive conduct as pre-condition to ordering terminal access or reciprocal switching); (9) Railroad Competition Act of 2003, H.R. 2924, 108th Cong., § 5 (2003) (abrogating *Midtec* by prohibiting Board from requiring evidence of anticompetitive conduct as pre-condition to ordering terminal access or reciprocal switching); (10) Railroad Competition Act of 2003, S. 919, 108th Cong., § 5 (2003) (same); (11) Surface Transportation Board Reform Act of 2003, H.R. 2192, 108th Cong., § 104 (2003) (overturning *Midtec*); (12) Railroad Competition Act of 2001, S. 1103, 107th Cong., § 103 (2001) (abrogating *Midtec* by providing that, in considering requests for reciprocal switching or terminal access, STB "may not require evidence of anticompetitive conduct by a rail carrier from whom access is sought"); (13) Surface Transportation Board Reform Act of 2001, H.R. 141, 107th Cong., § 104 (2001) (same); (14) Railroad Competition and Service Improvement Act of 1999, H.R. 2784, 106th Cong., § 7 (1999) (overturning *Midtec* by prohibiting STB from requiring evidence of anticompetitive conduct as condition to ordering terminal trackage rights or reciprocal switching); (15) Railroad Competition and Service Improvement Act of 1999, S. 621, 106th Cong., § 7 (1999) (same); (16) Surface Transportation Board Reauthorization Act of 1999, H.R. 3163, 106th Cong. § 6 (1999) (same); (17) Surface Transportation Board Reform Act of 1999, H.R. 3446, 106th Cong., § 104 (1999) (to same effect); and (18) Surface Transportation Board Modernization Act, H.R. 3398, 106th Cong., § 12 (1999) (overturning *Midtec* by changing the standards for terminal access and reciprocal switching and altering the procedure for Board action).

[35] *See* S. REP. NO. 111-380, at 12 (2010) (stating that Surface Transportation Board Reauthorization Act of 2009 "would overturn the mid-1980s *Midtec Paper* decisions" and would require Class I carriers to quote bottleneck rates); 153 Cong. Rec. E1016 (statement of Rep. Oberstar) (May 10, 2007) (Railroad Competition and Service Improvement Act of 2007 would "eliminate bottlenecks" and prohibit STB from requiring abuse of market power to order competitive access); 145 Cong. Rec. E2482 (statement of Rep. Oberstar) (Nov. 19, 1999) (Surface Transportation Board Reform Act of

explained, "once an agency's statutory construction has been fully brought to the attention of the public and Congress, and the latter has not sought to alter that interpretation although it has amended the statute in other respects, then presumably the legislative intent has been correctly discerned." *United States v. Rutherford*, 442 U.S. 544, 554, n.10 (1979); *see also United States v. Riverside Bayview Homes, Inc.*, 474 U.S. 121, 137 (1985) (congressional refusal to overrule agency construction of legislation is "evidence of the reasonableness of that construction, particularly where the administrative construction has been brought to Congress' attention through legislation specifically designed to supplant it"). Thus, Congress' constant refusal to adopt legislation overruling the *Midtec* standard for access under Section 11102(c) produces an unusually strong case of legislative acquiescence in, and ratification of, the existing *Midtec* standard for access and the Board's other competition policies. Because of this congressional ratification, the Board lacks the authority to rewrite fundamental policies that Congress has explicitly endorsed and repeatedly refused to revise.

V. The Proposed Regime Change Is Reckless.

The Board must abandon this proposal because it is an unlawful and unjustified departure from longstanding policies that engendered serious reliance interests. In addition, the proposal should be abandoned as poor public policy.

Evidence of the Board's reckless approach to this rulemaking abounds, including in the form of the InterVISTAS Report. The Decision was issued on July 25, 2016, a month and a half before the InterVISTAS Report was issued on September 14, 2016. It is difficult to believe that the Board would commission an

---

1999 would "correct[] the Board's 'bottleneck' decision" and "make[] it easier to secure competing rail service in terminal areas, and by reciprocal switching").

independent economic study to explore using forced access as an alternative to rate regulation, only to issue the Decision without the benefit of receiving the results of that independent study. Had the Board waited for the InterVISTAS Report before issuing the Decision, it may have reconsidered the wisdom of proposing an economically invalid access regime that runs contrary to congressional intent.

a. A lax forced access regime will undermine the financial health of the railroad industry.

As the Board noted in 2012, "this Board must consider the impact of [a forced access] proposal on the financial health of the railroad industry." *Petition for Rulemaking to Adopt Revised Competitive Switching Rules*, STB Docket No. EP 711, at 7 (served July 25, 2012). The truth of this statement is self-evident and the reason straightforward: forced access risks weakening the ability of the industry to engage in differential pricing.

Congress, the courts, and this agency have all observed that differential pricing is vital to the financial health of the industry and benefits all rail customers. As the STB has explained, "the core regulatory principle in the rail industry is that a railroad must be able to engage in some form of demand-based differential pricing to have the opportunity to earn adequate revenues." *See Major Issues in Rail Rate Cases*, STB Ex Parte No. 657, at 20 (Sub-No. 1) (served Oct. 30, 2006). The ICC "consistently recognized that differential pricing is crucial to the viability of the industry." *Intramodal Rail Competition – Proportional Rates*, 1990 MCC LEXIS 70 at *8 (April 17, 1990). The federal courts agree.[36] And Congress has recognized

[36] *See, e.g., Union Pac. R.R. Co. v. United States*, 637 F.2d 764, 767, n.2 (10th Cir. 1981) ("[T]he railroads may propose a rate which includes a price increment over and above fully allocated costs in order to assist them [sic] attain adequate revenue levels. This method of 'differential pricing' has been judicially approved as a valid means of achieving the ultimate goal of the 4R Act which is to financially regenerate the nation's railroads."); *Burlington N. Inc. v. United States*, 661 F.2d 964, 968, n.11 (D.C. Cir. 1981) (explaining that the 4-R Act's "command permits some rates to be set at a level exceeding fully allocated costs in order to compensate for those rates which must be set at less

that differential pricing is ultimately in the best interest of all shippers, in part because such a policy is necessary to enable railroads to earn revenues sufficient to support adequate service and capital investment.[37]

A thoughtful and meticulous investigation into the impact of this forced access proposal is required before the agency places in jeopardy a "core regulatory principle" that is "critical to the viability of the industry."

Yet none was undertaken. Nowhere does the agency quantify the scope of its proposal, explaining how much traffic would be eligible under either path to forced access. Nowhere does it consider the impact of its proposal on the railroad industry's ability to recover the substantial joint and common costs of its network. Nowhere does the STB pay heed to the inherent conflict between its forced access proposal and the core regulatory principle in the railroad industry. The Board instead actually proposes to forbid railroads from presenting evidence in individual forced access proceedings about "the general health of the rail industry, or revenue adequacy." Decision at 18.

The Board's silence on this issue—overlooking an issue it had earlier conceded is a fundamental inquiry of any proposal to liberalize the use of Section 11102(c)—violates every tenet of rational decisionmaking. It also cannot be reconciled with its duty to make an "adequate and continuing effort" to assist carriers to achieve and sustain revenue adequacy. 49 U.S.C. § 10704(a)(2).

---

than fully allocated costs to meet competition from other transport modes. This was neither arbitrary nor forbidden by the Act. It is pertinent to the objective of providing an adequate overall level of earnings. If traffic with a high value of service is viewed in isolation it bears a heavy burden. Yet all shippers ultimately benefit when the rail carriers are able to generate revenues needed for survival.").

[37] H.R. REP. NO. 96-1035, at 39-40 (1980).

b. A lax forced access regime will reduce investments.

Railroads take many considerations into account when making investment decisions. Regulatory policies are no exception. A lax forced access regime like that proposed by the Board would "fundamentally alter NS's investment decision-making process" and would "adversely affect the levels of investment and quality of service throughout NS's entire network." V.S. Friedmann at 2.

The STB's proposed rules create a risk of substantial loss in the contribution earned from line-haul traffic, which would cause Norfolk Southern to "no longer be able to predict the contribution earned from traffic on a line with the appropriate level of certainty necessary to support the same levels of infrastructure and other investment on that line." *Id.* at 7. As a result, "traditionally low-risk investment propositions" would be converted into "high-risk propositions." *Id.* This would mean that NS may need to modify its investment decision-making process to account for the risk. Importantly, these modifications would be required even in the event that there was simply a "*risk* of a substantial loss in contribution earned from a customer as a result of the STB's proposed rules, regardless of whether the customer actually petitions the STB for forced switching." *Id.* (emphasis in original).

These changes to investment decisions would not only harm NS and its network, but would also harm NS's customers because NS would be more likely to short-line, discontinue, or abandon lines. *Id.* at 7-8. This would generally result in diminished service to customers. For example, in the event that reduced contribution (or the risk of such a reduction) earned from an "Anchor Customer"[38] no longer justified NS's prior levels of investment on the line, "NS would need to

[38] Anchor Customers are defined as significant customers concentrated at the end of a line. *Id.* at 3.

reduce its investments along the supporting interior portions of the Anchor Customers' route." *Id.* at 9. As a result, intermediate customers along the route would also be harmed and would suffer from inferior service. *Id.*

As Mr. Friedmann summarizes:

> [T]he STB's proposed rules would alter NS's investment decision-making process for major portions of its network, forcing NS to further downsize its network in order to compensate for the heightened regulatory risk and uncertainty related to the *potential* for changing traffic flows and traffic volumes—without any guiding principles as to the occurrence, location, and extent of these changes. Under such conditions, there is no guarantee that NS's downsized network would be able to serve customers and the public interest.

Id. at 10 (emphasis in original).

Mr. Friedmann's expectations about the impacts of the proposal upon NS's investment decisions are echoed by Professor Michał Grajek, who predicts a "material reduction in long-term investment should the Board relax its current standards for forced reciprocal switching." V.S. Grajek at 3.

Professor Grajek's conclusions are supported by his extensive empirical research into the European Union's telecommunications industry, where he found that "higher stringency of regulation . . . discouraged investment by incumbent firms;" that "easier mandated access discouraged investment by individual entrants already in the market place;" and that "the sharp decrease in investment by incumbent firms overwhelmed the more modest increases in investment from market entrants." *Id.* at 7. The detected net lost investment from access regulations is simply staggering:

> Our published empirical research revealed the overall effect of access regulations in the EU's telecommunications industry was a *net loss of €16.4*

> *billion ($15 billion)* in private investments over a decade, which corresponds to net loss *over 20% of the total industry infrastructure stock*. That net loss would rise to *over €40 billion ($36.5 billion)* without the counterbalancing investments from new market entrants to the industry—investments that are unlikely to occur in the U.S. rail industry.

Id. at 3 (emphasis added).

In short, Professor Grajek expects that "the revised reciprocal switching regulations will have a pronounced negative impact on future investment in U.S. railroad infrastructure." *Id.* at 8. If the Board adopts its rules as broadly proposed, Professor Grajek anticipates that

> [g]iven the anticipated breadth of their applications, the proposed revised reciprocal switching regulations will put a significant strain on the future investment in U.S. rail infrastructure and the ability of the industry to meet the transportation needs of the U.S. economy in the coming decades, especially if those regulations are coupled with access conditions that do not adequately compensate the infrastructure owners—for instance, by ignoring the opportunity cost in the Efficient Component Pricing Rule (ECPR).

Id. at 3.

c. A lax forced access regime will wreak havoc on operating efficiency.

The Board previously asked for evidence about the impact on rail efficiency from a forced access regime. This was wise. In response, the railroads then submitted a mountain of testimony describing the real and substantial burden on network efficiency from introducing forced access. The Board then completely and irresponsibly ignored that evidence in its Decision. This is inexplicable.

As Norfolk Southern has described in the past—and as NS Assistant Vice President Transportation Network, Jeffrey Sliger, explains in his attached Verified

Statement—NS's network planning "efforts are aimed at placing the right resources in the right place based on predictions of [. . .] traffic flows so that Norfolk Southern can maximize the use of its resources and provide the best possible service quality and reliability to *all* of our customers." V.S. Sliger at 2 (emphasis in original). There are several principles that guide NS network design planning, all of which are geared toward running an efficient, customer-focused network. "These principles include maximizing long-hauls, minimizing car handlings and switches, minimizing the number of times a car must be handled in a yard, maximizing train lengths, consolidating traffic flows, and generating efficiencies in any way possible." *Id.* at 5. These principles drive resource and investment decisions to ensure that "the proper assets—cars, locomotives, and crews—[are] in the right place" at the right time. *Id.* at 5.

Any changes to system design that require equipment acquisitions or personnel hiring can take months or even years. "For example, it takes at least six to nine months from the decision to add additional conductors in a location to advertise, hire, train, and qualify new employees on that territory. Engineers take even longer, between twelve and fifteen months." *Id.* at 6. Because of these long lead-times, Norfolk Southern has "limited options to respond in the short-term to increased resource demands." *Id.* at 7. As a result, sudden traffic shifts can lead to operating problems and service failures.

An unanticipated shift in traffic in one area can have significant consequences across the entire NS system. When increased demands constrain capacity and slow velocity rates on one line, the entire network is affected. Norfolk Southern experienced such a network-wide impact in 2014, when unexpected increases in crude oil and other volumes resulted in congestion on NS's Northern

Region which "affected the velocity and fluidity of Norfolk Southern's entire system." *Id.* at 7.

Another aspect of rail operations that has a significant impact on the speed at which a shipment can move over the network ("velocity") is the number of handlings that a shipment incurs throughout the route of movement. For merchandise traffic, the handlings—at origin, destination, and at intermediate terminals—"account for the majority of the time that a typical shipment spends in transit. Each handling event consumes resources and introduces delays in transit time for the traffic." *Id.* at 9. As displayed in Figure 2, below, road transit time accounts for only around a quarter of the total transit time for a typical general merchandise shipment:

Figure 2
Percentage of Total Transit Time for NS Merchandise Shipments

This figure demonstrates that the intermediate handlings—that is, the amount of time that a car spends at a yard as a result of intermediate handlings—represent the largest component of transit time. As Mr. Sliger testifies, "[t]he STB's proposal would directly and adversely affect this intermediate handling component by increasing the number of car handlings per shipment." *Id.* at 9-10.

Each additional handling will slow down velocity of the shipment. NS always looks for opportunities to maximize velocity, and, in turn, to minimize the number of intermediate car handlings. *Id.* at 11. By removing intermediate handlings on merchandise traffic, the benefits are felt across the network, resulting in increased speeds for "even those movements that require no handling themselves." *Id.* at 12. "[T]he demonstrable inverse relationship between intermediate handlings and shipment velocity has substantial consequences for the service that Norfolk Southern provides its customers." *Id.* at 13.

One illustration of the ways NS has sought to minimize intermediate handlings is NS's recent decision to invest $160 million to expand its classification yard at Bellevue, Ohio. "This major capital project nearly doubled the prior capacity of Bellevue Yard." *Id.* at 15. As just one example of the many benefits of the Bellevue expansion, Norfolk Southern was able to eliminate an intermediate handling in the congested Chicago area between it and Canadian National, thereby removing an average of one day of transit time. *Id.* at 16.

The STB's proposal would reverse NS's efforts to minimize intermediate handlings, streamline traffic, improve system velocity, and thereby improve customer service. Most notably, "[t]he STB's proposal would introduce additional intermediate handling events into the network in the form of new, forced switching with other carriers at some number of unknown locations." *Id.* at 17. Mr. Sliger notes that a new interchange shipment could have widespread impacts not only on the handling of that shipment itself, but to shipments destined for other customers. *Id.*

These new shipments will add complexity to the network, which will have cumulative impacts that harm all customers. Mr. Sliger summarizes the numerous negative impacts of introducing even feasible, planned switching, on the system:

> [E]ach successive grant of forced switching would further increase the average number of handlings required per shipment, slowing network velocity and therefore degrading overall service. Car cycle times would increase for the subject traffic as well as other impacted traffic, straining resources across a network that relies upon shared utilization of common resources. Customers would respond by injecting more volume into the system to compensate for longer transit times. Slower shipment velocity would also increase the track capacity consumed by each carload, further affecting the fluidity of the network.

Id. at 21.

The overall impacts of any individual forced switching decision are unforeseeable. Even changes to current customers' needs can have widespread effects on the network. Mr. Sliger offers a number of examples of the widespread effects of sudden changes to a single customer that can spread geographically. *See id.* at 26-28. In one striking example, one NS shipper suddenly experienced a spike in demand from its customers around Dragon, MS in mid-2015. Traffic volumes increased from an average of 10-15 cars per day to more than 25 per day, with frequent spikes of more than 40 cars per day. This required extra train blocks to serve the customers, disrupting normal operations. *Id.* at 28. When trains reached maximum length, cars would have to be left in the yard, consuming space and slowing transit times. Those cars may then displace cars intended for the following train, thereby "perpetuating the oversubscription." *Id.*

Once the cars arrived in Birmingham, customers were unable to accept delivery of the increased volumes at their facilities at one time, and as a result NS had to stage the cars until the customers were able to accept them. These cars therefore consumed capacity in the yard and on the line of road, thereby "impacting yard and train operations, including Amtrak's Crescent service." *Id.* Ultimately,

those impacts required Norfolk Southern to reroute the traffic 286 miles out of route to Sheffield, AL, to be switched and stored until the customers could receive the traffic. While traffic returned to normal levels, "this one temporary fluctuation ended up requiring Norfolk Southern to redesign its service multiple times and affected multiple yards and numerous other scheduled services." *Id.* at 28.

This example is but one of many instances in which a small shift in traffic results in significant impacts that have far-reaching effects.

Each grant of forced switching will compound service impacts and unanticipated shifts in traffic across the NS system. The STB's proposal "would both reverse many of the efficiency improvements Norfolk Southern has achieved through service design and make the overall system more susceptible to disruptions, like weather, that are beyond Norfolk Southern's control." *Id.* at 29. The ultimate losers in this will be the public and NS's customers, who will be met with a slower network and reduced service.

d. The Board cannot control the regulatory beast once unleashed.

The Board cannot deny that using its coercive powers to compel forced access, as proposed, carries a real and present danger of causing more harm than good. But the Board believes it can control the impact of the new regime on a case-by-case basis. It assumes that its case-by-case approach will provide it sufficient discretion to tailor the coercive application of its proposal. Indeed, the Board chose a flexible approach to make this coercive power available more "fairly" to all shippers, yet asks Norfolk Southern to have faith that the Board can carefully calibrate the impact on the industry on a case-by-case basis.

It is improbable that the Board can calibrate the impact of its proposal for a number of reasons. First, the Board proposes to throw open Door #2 (the "necessary

to provide competitive rail service" prong) to create virtually on-demand forced access. Any shipper located within a reasonable distance of a working interchange who can satisfy the Board's increasingly mechanical and conservative market dominance test gets forced access (unless the switching is unsafe or impractical). Thus, the Board's proposal provides little genuine discretion to limit who can walk through Door #2. And, the amount of traffic that may walk through Door #2 is significant. According to the AAR's analysis submitted contemporaneously in this docket, somewhere between 900,000 and 2.3 million carloads of traffic *per year* may be eligible for immediate forced access under the Board's proposal.

Second, the Board also has no off-ramp to close Door #1 (the public-interest prong). There is nothing in the proposed rules that would permit the agency to tighten the standard for relief on a case-by-case basis. According to the AAR's analysis, a breathtaking 11.4 to 12.6 million carloads of traffic per year may be eligible for forced access under the public-interest prong. The only way the Board could control the beast is to adopt new restrictions in the future, but doing so would likely require another lengthy rulemaking as it would be arbitrary and capricious to apply different standards to similarly situated shippers.

Third, railroads will seek to comply with the new federal law. The Board thus disregards the pronounced impact that promulgating a rule mandating forced access or even issuing a single decision forcing a switching agreement on any carrier will have on the entire rail industry. The Board never explains how it intends to carefully moderate the impact of its proposed rule on the industry when the vast majority of the impact will occur outside the halls of the agency.

Fourth, the troubled history of past rail regulation does not bode well for the ability of the agency to conduct this balancing act. The ICC was also well-intentioned in its efforts to regulate the rail industry before Staggers. It was filled

with intelligent commissioners supported by knowledgeable staff. Yet untethered to sound economic principles, the heavy hand of ICC regulation ultimately doomed the financial integrity of the entire industry.

Fifth, the Board would have trouble discerning the impact of its lax new access regime on efficiency, service, and investments. As Mr. Sliger explains, "Perhaps the greatest misconception in the STB's proposed case-by-case approach is the implicit assumption that the Board will be able to foresee the traffic flows that will arise under each forced switching application and therefore predict the resulting impacts. The history of the railroad industry, including recent events, disproves any such belief." V.S. Sliger at 26. Unanticipated traffic demands from forced access can have serious negative impacts on *unrelated* customers located in the same geographic area or reliant on the same facilities. *Id.* at 27-28.[39] While service issues arise locally, in a connected network the effects will quickly spread geographically. *Id.* at 28-29. The impact will compound. "Both of these effects—the immediate service impacts of introducing additional handlings, and the consequences of unanticipated shifts in traffic subject to forced switching—will worsen with each additional grant of forced switching." *Id.* at 29. Each new interchange event mandated by the STB will inject another area of volatility into NS's network. "By placing more strain on Norfolk Southern's resources to handle existing traffic," Mr. Sliger explains, "the STB's proposal would both reverse many of the efficiency improvements Norfolk Southern has achieved through service

[39] The Board is well aware of the challenging and unanticipated traffic demands that are battering the industry. For example, Vice Chairman Miller commented that "the railroads are currently facing changing economic conditions," and "find themselves in a difficult environment." Decision at 33. Similarly, Commissioner Begeman noted that "rail volumes have been down all of 2016, and are currently down nearly six percent from just a year ago." Decision at 36. These market fluctuations reveal the susceptibility of the industry to changes in demand from its customers and the fallacy that the Board can foresee the traffic flows that will arise under each forced access application and predict the resulting operational impacts.

design and make the overall system more susceptible to disruptions, like weather, that are beyond Norfolk Southern's control." *Id.*

Finally, the Board is forbidding a railroad from raising revenue adequacy as a defense or from challenging the wisdom of the lax forced access regime. Decision at 18 ("Individual reciprocal switching proceedings would not be an appropriate forum to litigate, for example, the general merits of reciprocal switching as a statutory remedy, the general health of the rail industry, or revenue adequacy."). As such, if the new regime is indeed causing a cascading adverse impact on rail operations, or is threatening the ability of carriers to engage in necessary demand-based differential pricing, the Board has proposed to exclude such evidence. Without the ability to raise the cumulative impact and down-stream effect of forced switching requests, how is a railroad to create a record to permit the agency to measure the impact of this new regime? In other words, the Board hopes to vigilantly calibrate the impact of the new rules on the industry, but blinds itself to the evidence needed for such a balancing act.

The belief that the STB can somehow control the risks from a lax forced access regime (revenue inadequacy, reduced capital investments, lower efficiency, poorer service), is a thin and inadequate reed upon which to stake the continued viability of the industry, all to create an additional and artificial path to lower rates for a select group of shippers.

VI. The Board Must Perform a Benefit-Cost and Environmental Analysis of the Likely Impacts of the Proposed Rules.

a. The Board must conduct a benefit-cost analysis of the proposed rules.

It is a fundamental principle of administrative law that "administrative agencies are required to engage in reasoned decisionmaking." *Michigan v. EPA*, 135 S. Ct. 2699, 2706 (2015) (internal quotation marks omitted). To do so, an

agency must consider each "important aspect of the problem." *Motor Vehicle Manufacturers Association of the United States v. State Farm Mutual Automobile Insurance Co.*, 463 U.S. 29, 43 (1983).

The potential costs of an agency's action are an important aspect that the agency must consider before acting. *See Michigan*, 135 S. Ct. at 2707. The principle is rooted in common sense. An agency "must consider costs because reasoned decisionmaking requires assessing whether a proposed action would do more good than harm." *Mingo Logan Coal Co. v. EPA*, 829 F.3d 710, 732 (D.C. Cir. 2016) (Kavanaugh, J., dissenting). As the Supreme Court has emphasized: "Consideration of cost reflects the understanding that reasonable regulation ordinarily requires paying attention to the advantages and the disadvantages of agency decisions." *Michigan*, 135 S. Ct. at 2707.

Indeed, leading jurists and scholars all agree that assessing the costs of an agency action is an essential component of reasoned decisionmaking:

- **Justice Breyer**: Every agency choice "requires a decisionmaker to weigh advantages against disadvantages, and disadvantages can be seen in terms of (often quantifiable) costs." *Entergy Corp. v. Riverkeeper, Inc.*, 556 U.S. 208, 232 (2009) (opinion of Breyer, J.).
- **Professor Sunstein**: "A rational system of regulation looks not at the magnitude of the risk alone, but assesses the risk in comparison to the costs." Cass R. Sunstein, *Interpreting Statutes in the Regulatory State*, 103 HARV. L. REV. 405, 493 (1989).
- **Professor Pierce**: "All individuals and institutions naturally and instinctively consider costs in making any important decision. . . . [I]t is often impossible for a regulatory agency to make a rational decision without considering costs in some way." Richard J. Pierce, Jr., *The Appropriate Role of Costs in Environmental Regulation*, 54 ADMIN. L. REV. 1237, 1247 (2002).
- **Professors Arrow, Cropper, Eads, Hahn, Lave, Noll, Portney, Russell, Schmalensee, Smith, and Stavins**: "Because society has limited resources to spend on regulation, benefit-cost analysis can help illuminate the trade-offs involved in making different kinds of social investments. In this regard, it seems almost irresponsible to not conduct

> such analyses, because they can inform decisions about how scarce resources can be put to the greatest social good. . . . Benefit-cost analysis should be required for all major regulatory decisions." *Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation?*" 272 SCIENCE 221, 221 (1996).

In addition to the consensus that a benefit-cost analysis is good government, a benefit-cost analysis is also mandated by law. Professor Lutter of the University of Virginia's Frank Batten School of Leadership and Public Policy explains that the failure to perform benefit-cost analysis is inconsistent with the Congressional Review Act and "runs roughshod over multiple executive orders that underscore the need for such analysis by federal agencies—including independent regulatory agencies like the STB." V.S. Lutter at 7. He observes the wide-spread acceptance of the requirement for benefit-cost analysis in rational decisionmaking by other independent regulatory agencies like the FCC, FTC, Consumer Product Safety Commission, FERC, Nuclear Regulatory Commission, Consumer Financial Protection Board, and the SEC. *Id.* at 9. And he explains how "[b]enefit-cost analysis has become an accepted and essential part of federal practices for significant regulatory decisions, supported by various executive orders and statutes." *Id.* at 12. "[A]gencies should assess all costs and benefits of available regulatory alternatives," explains Professor Lutter, "including the alternative of not regulating." *Id.*

Here, the Board proposed an upheaval of its longstanding forced access rules, while giving the potential cost no thought at all. This failure is bewildering. At the urging of the agency itself, Norfolk Southern and the railroad industry submitted extensive evidence in the original Ex Parte No. 711 docket demonstrating that changes that would permit such forced access would have profound impacts on traffic patterns and could well cause disruptions not only in the immediate service area surrounding terminals in which switching orders were granted, but also across

their networks. In the face of the substantial and unrebutted evidence of Norfolk Southern and other railroads of the adverse costs that would result, the Board clearly has an obligation to assess the significance of those costs.

However, one searches in vain for any mention of the benefits-costs calculations that should underlie a proposal of this sort, let alone any actual analysis of the likely effects of the Board's proposed rules. Although the Decision makes passing reference to the evidence and arguments that a number of parties, including Norfolk Southern, made regarding the "serious, adverse effects on rail service, carrier revenues, network efficiency, and incentives to invest in the rail network" (Decision at 7), the Board makes no effort to assess the magnitude of these impacts or the magnitude of whatever countervailing benefits it may have believed the proposed rules would bring to the public. As Commissioner Begeman observed, the "Board assessment [is] both unspecified in today's proposal and absent from the record." *Id.* at 34, fn. 30.

The Board cannot seek shelter behind its proposed "case-by-case" adjudication of forced access applications. It cannot, in other words, argue that it need not consider costs here—when deciding whether to capsize three decades of established precedent—because it will address the costs later when deciding how much forced access to permit. The Supreme Court in *Michigan* explicitly rejected that approach: "EPA argues that it need not consider cost when first considering *whether* to regulate power plants because it can consider cost later when deciding *how much* to regulate them. . . . Cost may become relevant again at a later stage of the regulatory process, but that possibility does not establish its irrelevance at *this* stage." *Michigan,* 135 S. Ct. at 2709 (emphasis in original).

To state the obvious, without any effort to evaluate the relative harm versus good inherent in its proposed rules, the Board has no basis to make a reasoned

judgment about the likely effect on the industry. This is not "reasoned decisionmaking." *Id.* at 2706.

b. The Board must conduct a NEPA analysis of the proposed rules.

The National Environmental Policy Act ("NEPA") requires federal agencies to prepare "a detailed statement by the responsible official on ... the environmental impact" of any federal actions "significantly affecting the quality of the human environment." 42 U.S.C. § 4332(C); *Northern Plains Resource Council, Inc. v. STB*, 668 F.3d 1067, 1072 (9th Cir. 2011). NEPA's purpose is twofold: "(1) to ensure that agencies carefully consider information about significant environmental impacts and (2) to guarantee relevant information is available to the public." *Id., citing Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989).

An environmental impact statement ("EIS") must analyze the direct, indirect, and *cumulative* impacts from a proposed major federal action. 40 C.F.R. § 1508.25(c). "Cumulative impact" is defined as follows:

> Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

40 C.F.R. § 1508.7.

Here, the Board failed to comply with NEPA's procedural requirements. The proposed rules, if adopted, would constitute a major Federal action with the strong possibility of significantly affecting the quality of the human environment, the standard under the Board's regulations for requiring the preparation of an EIS. *See* 49 C.F.R. § 1105.4(f). Yet the Decision contains no discussion of the likely

environmental effects of the proposed rules, save for a cursory mention of "environmental impacts" in a single sentence in which the Board lumped together a number of "unknowns" that rail carriers raised as warranting examination.

NEPA demands more, especially in the face of a record compiled here and in the Ex Parte No. 711 proceeding that includes extensive testimony about the probable adverse effects on railroad operations, including system fluidity and interference with both terminal and line haul operations. Indeed, the most immediate impacts of orders requiring reciprocal switching will be felt in air quality non-attainment areas (*i.e.*, in urban terminal areas and in yard operations), areas of heightened environmental concern. Given the tremendous amount of traffic that would be eligible to petition for forced access under the proposed rules, as described in the AAR submission in this proceeding, the Board must conduct an EIS to analyze the direct, indirect, and *cumulative* impacts from this major federal action. *See Mid States Coalition for Progress v. STB*, 345 F.3d 520, 549 (8th Cir. 2003) ("When the *nature* of the effect is reasonably foreseeable but its *extent* is not, we think that the agency may not simply ignore the effect.") (emphasis in original).

VII. The Proposed Regime Change Lacks A Sound Approach To Forced Access Pricing.

By statute, the Board's role in setting compensation for forced switching agreements is narrow. The agency may set compensation only "if the rail carriers cannot agree upon such conditions and compensation within a reasonable period of time." 49 U.S.C. § 11102(c)(1). If the carriers reach such an agreement, it is of course a bedrock principle that a shipper cannot challenge a division or other compensation between the carriers; the shipper's only interest is that the resulting transportation rate from origin to destination shall be reasonable as a whole. *Great Northern Ry. v. Sullivan*, 294 U.S. 458, 462-63 (1935); *Metropolitan Edison Co. v.*

Contrail, 5 I.C.C.2d 385, 400-10 (1989) (finding *Great Northern* "continue[s] to have vitality after the Staggers Act").

Notwithstanding its limited role, the Board seeks comments on two vague proposals of its own design for how it would set compensation if there is no marketplace resolution. NS's position is simple. First, the agency must abide by the express limits set forth in Section 11102(c)(1). The agency should defer to the marketplace and only intervene where the carriers cannot agree on the market value. Second, if the Board is ever in the position of setting an access price, access pricing must compensate the incumbent for its full lost opportunity costs to preserve differential pricing. Such compensation is required by the Staggers Act, sound economic principles, and the Constitution.

a. The statute, sound economics, and the Constitution demand the inclusion of full lost opportunity costs.

Where a railroad has engaged in no wrongdoing—where it has engaged in no anticompetitive conduct but instead is providing adequate service over an efficient route at reasonable rates—that railroad is entitled by statute, sound economic principles, and the Constitution to the full opportunity costs imposed on the incumbent carrier from forced access.

The Statute. Congress instructed the Board to make an adequate and continuing effort to assist carriers to achieve and sustain revenue adequacy. 49 U.S.C. § 10704(a)(2). The road to revenue adequacy and the ability to price differentially are joined at the hip; "[w]e have consistently recognized that differential pricing is crucial to the viability of the industry." *Intramodal Rail Competition – Proportional Rates*, 1990 MCC LEXIS 70 at *8 (April 17, 1990). As such, "the core regulatory principle in the rail industry is that a railroad must be able to engage in some form of demand-based differential pricing to have the

opportunity to earn adequate revenues." *See Major Issues in Rail Rate Cases*, STB Ex Parte No. 657, at 20 (Sub-No. 1) (served Oct. 30, 2006). Indeed, without the ability to charge differential rates, a railroad cannot earn sufficient revenue to cover both its variable and fixed costs, invest in the maintenance and improvement of its network, and produce a reasonable return for its investors and quality service product for shippers.

The statutory command for a continuous effort to permit a carrier to achieve and sustain revenue adequacy requires the agency to include the full opportunity costs from forcing an innocent carrier to forgo the contribution to its network from single-line service. As the Eighth Circuit explained, "requiring carriers to provide separately challengeable rates on bottlenecks would prevent them from exploiting bottlenecks and charging rates up to SAC for complete origin-to-destination service." *MidAmerican*, 169 F.3d at 1109. Restricting a carrier's ability to engage in differential pricing, the court explained, would "impede the industry's efforts to achieve revenue adequacy, which is necessary for long-term capital investment, and ultimately, for a safe and efficient rail system." *Id.*

Sound Economics. Norfolk Southern retained two eminent economists to counsel the Board on the appropriate design of any forced-access compensation. Professor Sappington from the University of Florida—and former Chief Economist for the Federal Communications Commission—is a leading expert in industrial organization with a research focus in the design and implementation of regulatory policy. Professor Armstrong from the University of Oxford—and current co-editor of the prestigious Rand Journal—is a world-renowned expert on access pricing, having published several of the seminal papers on this subject.

Together, Professors Armstrong and Sappington describe the sound economic principles that must be the foundation for any forced access compensation

methodology (while also questioning the policy justification for any forced access provision at all). First, they reiterate the central importance of protecting demand-based differential pricing in the rail industry. V.S. Armstrong/Sappington at 3-4. The professors explain that

> [t]he Board has wisely implemented a comprehensive differential, demand-based pricing policy for rail transport services that is designed in part to enable efficient rail carriers to secure revenues that cover both variable and fixed costs. Such a policy thereby enables the carriers to undertake the investments that are required to provide ongoing high-quality transport services to all shippers. A forced access policy that undermines the Board's comprehensive differential pricing policy can reduce the aggregate welfare of all shippers combined, and thereby fail to serve the public interest.

Id. at 7.

Second, the professors demonstrate that, if the Board is ever called upon to set an access charge, an access charge based on Efficient Component Pricing Rule ("ECPR") "is the only one that preserves the contributions to a carrier's fixed production costs—contributions that have been determined by rail transport prices that respect all of the Board's regulatory policies." *Id.* at 11. In contrast to cost-based access charges, "ECPR access charges can ensure industry cost minimization while consistently precluding the erosion of contributions to fixed and common costs. By preventing such erosion, ECPR access charges can help to ensure that rail carriers are able to finance the ongoing infrastructure investment that is required to deliver high-quality transport services to shippers." *Id.* at 14.

Finally, the professors caution that a cost-based access charge that only reflects a carrier's physical cost of supplying access, and does not include any relevant opportunity cost, risks jeopardizing "the carrier's ability to undertake the

investment required to deliver high-quality service to shippers on an ongoing basis." *Id.* at 11. This finding should not be surprising as the fundamental economics underlying the railroad industry have not changed. Fixed and common costs have not vanished, competitive forces from motor carriers and other modes continue unabated, and differential pricing remains "crucial to the viability of the industry." *Intramodal Rail Competition – Proportional* Rates, 1990 MCC LEXIS 70 at *8 (April 17, 1990); InterVISTAS Report at 121 ("Ramsey pricing allows the railroads to use differential pricing based on the willingness of the shippers to pay for the service, thus generating the needed revenue to cover costs and a reasonable return but with the minimum traffic or economic efficiency loss. None of the papers we analyzed propose changing this fundamental view.")

The Board must follow sound economic principles and protect the ability of the railroads to engage in demand-based differential pricing. Only by accounting for lost contribution, which necessarily allows differential pricing, can the Board ensure that its access pricing scheme fully compensates incumbent railroads for the true cost of forcing them to engage in reciprocal switching. *See* InterVISTAS Report at xv (pricing access to reflect an incumbent's net opportunity costs "by implication, invokes the Ramsey pricing principles implicit in modern U.S. railroad ratemaking"). Any access pricing scheme that compensates incumbent railroads at sub-ECPR levels will only cause the long-term health of the industry to deteriorate.

The United States Constitution. The Takings Clause fixes an outer limit to the Board's access compensation scheme. Any pricing scheme that forbids differential pricing is necessarily confiscatory and unconstitutional. By depriving railroads of the ability to negotiate mutually beneficial, market-based rates that reflect Ramsey pricing principles, such a pricing scheme would deprive railroads of the lawful and economic means of survival.

For over 100 years the railroads have had a protected property interest in their long haul. It has long been the case that: "The [rail]road that initiates the freight and starts it on its movement in interstate commerce should not be required . . . to transfer its business from its own road to that of a competitor . . . when that commerce initiated by it can be as promptly and safely transported by its road as by the line of a competitor." 45 Cong. Rec. 3475-3476 (1910) (statement of Senator Elkins); *see also United States v. Mo. Pac. R.R.*, 278 U.S. 269, 276-82 (1929) (holding that the purpose of the statutory limit on the ICC's power to prescribe through routes "is to protect the long haul routes of carriers"); *Thompson v. United States*, 343 U.S. 549, 560-61 (1952).

The Fifth Amendment entitles carriers to the fair market value of the property interest in their long haul taken from them by an interloper with a federal license. Fair market value is routinely defined without controversy to mean what a willing buyer would pay to a willing seller for the property rights in question. "In the absence of a market value, this may properly be determined by what the property 'brings in the way of earnings to its owner.'" *Spitzer v. Stichman*, 278 F.2d 402, 410 (2d Cir. 1960) (quoting *Monongahela Navigation*, 148 U.S. at 328).

Not surprisingly, the constitutional limitation coincides with the requirements of the statute and sound economics. When a railroad is forced to forego its statutory right to the long haul, the measure of its loss under the Takings Clause is the lost contribution to its network. Conceptually, forced access deprives the incumbent railroad of what it would have earned had it not been required by the federal government to hand over a customer to a competitor. Lost contribution is the component of the revenue the railroad would have earned on the long haul, minus whatever amount would have gone to cover the variable costs of that move. And the growing tide of rate regulation safeguards assures that the lost

contribution is indeed reasonable and contains no element of monopoly profits. It is, to use a familiar economic term, the railroad's opportunity cost of being forced to forgo its long haul rights and hand traffic to a competitor.

In the end, as Professor Grajek cautions,

> the proposed revised reciprocal switching regulations will put a significant strain on the future investment in U.S. rail infrastructure and the ability of the industry to meet the transportation needs of the U.S. economy in the coming decades, especially if those regulations are coupled with access conditions that do not adequately compensate the infrastructure owners—for instance, by ignoring the opportunity cost in the Efficient Component Pricing Rule (ECPR).

V.S. Grajek at 3.

b. The Board's dual proposals on access pricing are hopelessly vague

Citing a "relative lack of detail" regarding access pricing methodologies, the Board proposed two methods of its own creation. Decision at 25. But the Board's approaches themselves lack details. As such, it is practically impossible to discern whether these proposals follow the demands of the statute, sound economics, and the Constitution.

The first approach would set compensation "based on a specified set of factors." Relying on *Switching Charges & Absorption Thereof at Shreveport, LA* [*Shreveport*], 339 I.C.C. 65 (1971) (applying fully allocated cost approach), the set of factors "could include" geography, distance, the cost of the switching service, the capacity of the interchange facility, and "other case-specific factors."[40] *But see Switching Charges on Iron or Steel Scrap at Stockton, Ca.*, 356 I.C.C. 634, 638

[40] The Board also sought comments on whether the "specified" set of factors should include any portion of the incumbent rail carrier's opportunity cost.

(1977) ("[T]he fact that a proposed rate . . . exceeds the fully allocated cost level, does not, in itself, justify a finding that the charge is in excess of a maximum reasonable rate."); *Kansas City Power & Light Co. v. The Kansas City Southern Ry. Co.*, 361 I.C.C. 308, 323 (1978) (rejecting fully allocated cost approach used in *Shreveport*); *Intramodal Rail Competition*, 1 I.C.C.2d at 835 (rejecting fully allocated cost approach as compensation for forced switching as "arbitrary and economically unsound"). If the Board's first proposal is a re-warmed fully allocated costs approach, at a minimum, it reflects an unexplained and unwise departure from 40 years of agency precedent and sound economics.[41]

The second proposal is equally nebulous. The agency would adopt a variant of the agency's SSW Compensation methodology developed to set trackage rights fees in mergers. The Board asserts that while the SSW Compensation method is used to set trackage rights fees, "many of the principles" that inform that approach would apply to set compensation for a forced reciprocal switching agreement. Decision at 25. The Board states that the Rental Income in the SSW Compensation methodology would have an analogy in the form of an "Imputed Rental Income," a term nowhere defined and an analogy nowhere explained in the proposed rule. *Id.*

But using some undefined variant of SSW in this setting could reflect yet another unexplained departure from agency precedent and raise Constitutional infirmities, although impossible to say now given the vagueness of the proposal. In

---

[41] *See Houston Lighting & Power Co. v. United States*, 606 F.2d 1131, 1148 (D.C. Cir. 1978); *see also* InterVISTAS Report at 21 ("Economists have long debated the issue of sharing the portion of costs that are not allocable in a manner that is the least arbitrary. The consensus among economists is that fully distributed costs should not be used due to their arbitrariness and the misallocation of resources they can produce"); *see generally* Mayo & Sappington, *Regulation in a 'Deregulated' Industry: Railroads in the Post-Staggers Era*, 49 REV. IND. ORG. 203, 214 (2016) (citing economic literature showing "that the application of fully allocated costs for establishing rate ceilings can fundamentally undermine not only the ability to achieve efficient pricing but also the financial viability of the regulated industry.").

Intramodal Rail Competition, the ICC explained that the SSW approach is generally restricted to "where trackage rights have been imposed to remedy anticompetitive effects of a consolidation." 1 I.C.C.2d at 835. In that setting, the goal is to maintain the competitive status quo by putting the new railroad "in the same position as the owning carrier." *Id.* But the ICC observed that this compensation methodology does not provide an aggrieved railroad with the fair market value of that taken away, *i.e.*, compensation under normal condemnation principles. *Id.*

In the end, the Board's dual access price proposals are too vague for meaningful comment or to meet the basic requirements of the Administrative Procedure Act ("APA"). The APA envisions that agencies are supposed to propose rules for comment, not pose vague, open-ended questions. "[T]o make criticism or formulation of alternatives possible," *Home Box Office, Inc., v. FCC*, 567 F.2d 9, 36 (D.C. Cir. 1977), agencies must "describe the range of alternatives being considered with reasonable specificity." *Small Refiner Lead Phase-Down Task Force v. EPA*, 705 F.2d 506, 549 (D.C. Cir. 1983). An agency thus cannot merely offer "general notice that a new standard will be adopted" without any real guidance of what the new rule will be. *Horsehead Res. Dev. Co. v. Browner*, 16 F.3d 1246, 1268 (D.C. Cir. 1994) (per curiam). A vague undefined list of factors, or an undefined approach modeled off the SSW methodology, does not cut it; otherwise an agency "could issue broad NPRMs 'only to justify *any* final rule it might be able to devise.'"[42]

---

[42] *CSX Transp., Inc. v. Surface Transp. Bd.*, 584 F.3d 1076, 1082 (D.C. Cir. 2009) (citation omitted) (emphasis in original); *see Prometheus Radio Project v. FCC*, 652 F.3d 431, 450-52 (3d Cir. 2011); *Nat'l Black Media Coal. v. FCC*, 791 F.2d 1016, 1023 (2d Cir. 1986); *see also Time Warner Cable, Inc. v. FCC*, 729 F.3d 137, 170 (2d Cir. 2013); *Portland Cement Ass'n v. EPA*, 665 F.3d 177, 192 (D.C. Cir. 2011) (per curiam).

Although the proposal purports to provide guidance on how the agency will set compensation as needed in a particular case, the Board has proposed nothing but "mush." *See Paralyzed Veterans of Am. v. D.C. Arena L.P.*, 117 F.3d 579, 584 (D.C. Cir. 1997) ("A substantive regulation must have sufficient content and definitiveness as to be a meaningful exercise in agency lawmaking. It is certainly not open to an agency to promulgate mush and then give it concrete form only through subsequent less formal 'interpretations.'"), *overruled on other grounds*, *Perez v. Mortgage Bankers Ass'n*, 135 S. Ct. 1199 (2015); *see also Timpinaro v. SEC*, 2 F.3d 453, 460 (D.C. Cir. 1993) (reversing agency rulemaking for failing to consider providing regulated parties more concrete guidance). Indeed, the lack of any meaningful guidance in either proposal raises serious due process concerns. *See FCC v. Fox Television Stations, Inc.* [*Fox II*], 132 S. Ct. 2307, 2317 (2012) (agency violates due process when it "fails to provide a person of ordinary intelligence fair notice of what is prohibited" and "is so standardless that it authorizes or encourages seriously discriminatory enforcement"); *Grayned v. City of Rockford*, 408 U.S. 104, 109 (1972) (vague rules impermissibly permit "basic policy matters" to be decided in enforcement actions brought "on an ad hoc and subjective basis").

* * *

Norfolk Southern strongly urges the Board to reconsider its desire to use Section 11102(c) as an alternative path to rate regulation. Such a course is unlawful and unwise. The idea of using this narrow statutory provision to drive down transportation rates that are already reasonable and critical to the recovery of fixed and common costs of the network is simply inconsistent with the STB's statutory mandate to promote revenue adequacy and the fundamental economic underpinnings of the rail industry. But if the agency persists, and it ever has to establish an access charge, it must use compensation principles that are sound and

lawful. It must reaffirm that any fully allocated cost approaches are arbitrary and unsound. And the agency must permit the innocent incumbent railroad forced to relinquish it right to the long haul to recover its full opportunity costs. Otherwise, the access compensation would be confiscatory by denying the railroad the ability to engage in lawful differential pricing to the recovery joint and common costs *of its network*, and would "impede the industry's efforts to achieve revenue adequacy, which is necessary for long-term capital investment, and ultimately, for a safe and efficient rail system." *MidAmerican*, 169 F.3d at 1109.

CONCLUSION

America's railroads are not strangers to rate regulation. But rarely—indeed, never—has the industry been as resilient, as productive, and as *competitive* as it is today. To impose a novel, unlawful, unjustified, and ill-conceived regulatory scheme on the industry would be a grave mistake. True competition and market forces revived and continue to support the railroads; the Board's pursuit of synthetic competition as an alternative path to lower rates will only undermine this revival, inject inefficiency into streamlined rail operations, deter incentives to invest, and ultimately damage the very constituency the Board seeks to help.

James A. Hixon
John M. Scheib
David L. Coleman
Garrett D. Urban
Aarthy S. Thamodaran

Norfolk Southern Corporation
Three Commercial Place
Norfolk, VA 23510
(757) 629-2657

Raymond A. Atkins
G. Paul Moates
Matthew J. Warren
Richard E. Young
Hanna M. Chouest

SIDLEY AUSTIN LLP
1501 K Street, N.W.
Washington, D.C. 20005
(202) 736-8000

Counsel for Norfolk Southern Railway Company

October 26, 2016

BEFORE THE
SURFACE TRANSPORTATION BOARD

STB Ex Parte No. 711 (Sub-No. 1)

RECIPROCAL SWITCHING

VERIFIED STATEMENT OF DAVID R. GOODE

My name is David R. Goode. I served as Chairman, President, and CEO of Norfolk Southern Corporation ("Norfolk Southern") from 1992 through 2006. I began my career as a tax attorney with Norfolk & Western Railway Company ("N&W") in 1965. After the merger of N&W and Southern Railway Company in 1982, I served as Assistant Vice President – Taxation, Vice President – Taxation, and Executive Vice President – Administration for Norfolk Southern. I led Norfolk Southern through one of the most pivotal moments in the recent modern history of the U.S. freight rail industry: the division of Consolidated Rail Corporation ("Conrail") between CSX Transportation, Inc. ("CSX") and Norfolk Southern in 1998 ("Conrail Transaction"). I was awarded the John T. McCullough Logistics Executive of the Year Award by the National Industrial Transportation League in 1997; and I was selected as Railroader of the Year by *Railway Age* in 1998 and in 2005. I hold a Bachelor of Arts degree from Duke University and a Juris Doctor from Harvard Law School.

Based on my extensive rail industry expertise and leadership experience with Norfolk Southern, including my oversight of the investment decisions underlying the Conrail Transaction, I believe that the Surface Transportation Board's ("STB") proposed rule for

competitive switching would severely undermine one of the fundamental assumptions underlying the Conrail Transaction, namely, that the STB's regulatory regime would continue to permit single-line service to allow Norfolk Southern (and Norfolk Southern's shareholders) to receive the benefit of its bargain and justify its transactional, financial, and investment decisions with respect to the Conrail Transaction.

I. AN ESSENTIAL UNDERPINNING OF THE CONRAIL TRANSACTION WAS NORFOLK SOUTHERN'S UNDERSTANDING THAT THE STB ENCOURAGED CONSOLIDATIONS THAT ENHANCED SINGLE-LINE SERVICE.

As I described in *Fortune* in 1997, the Conrail Transaction created "two overlapping and pretty much competitive systems. Both Norfolk Southern and CSX will be able to offer single-line long haul routes. (Before, we were reliant on Conrail to make the connection on many long hauls.)."[1] The Conrail Transaction created four principal and comprehensive single-line routes for Norfolk Southern across the eastern U.S.: (1) Piedmont Route; (2) Shenandoah Route; (3) Mid-South Route; and (4) Southwest Gateways and Louisville Routes.[2]

This expanded ability to offer single-line service was the *critical* justification for and benefit of the Conrail Transaction, as evidenced by statements regarding the transaction from the public record, Norfolk Southern's financing plan for the transaction, and Norfolk Southern's capital investments related to the transaction.

A. Statements from the Public Record

In Railroad Control Application filed on June 19, 1997 with the STB in Finance Docket No. 33388, *CSX Corp. and CSX Transp., Inc., Norfolk Southern Corp. and Norfolk Southern Ry. Co. – Control and Operating Leases/Agreements – Conrail Inc. and Consolidated Rail Corp.*

---

[1] Justin Martin & David Goode, *Surviving a Head-On Collision*, FORTUNE (Apr. 14, 1997), *available at* http://archive.fortune.com/magazines/fortune/fortune_archive/1997/04/14/224970/index.htm.

[2] Application, Verified Statement of Thomas L. Finkbiner, at 25-30.

("Application"), CSX and Norfolk Southern repeatedly emphasized that, as a result of the end-to-end nature of the Conrail Transaction, the "CSX and NS systems will be able to offer extensive new single-line service – the most timely, reliable, and cost-effective form of rail service."[3]

In the Application, Norfolk Southern identified four public and private interest benefits directly flowing from this expanded ability to offer single-line service: (1) improved rail service for customers; (2) new commercial opportunities for customers; (3) efficiency gains for the railroads and customers; and (4) enhanced competitiveness. The excerpts below are merely a *sample* of the numerous statements in the Application describing these benefits.

First, improved rail service:

- "From an operational standpoint, with the expansion of NS's existing system through our use and operation of certain Conrail lines we will be able to create single-line service that will provide new and faster carload and intermodal services. . . . Customers will benefit through more consistent on-time deliveries, the elimination of intermediate switching, reduced transit times and increased equipment availability and utilization."[4]

- "As a general rule, interline rail service is fraught with opportunities for service failure because of differing priorities between carriers and the lack of a single sponsor overseeing the movement from start to finish. . . . The practical advantages of operating single line service instead of operating joint line service are manifold. Delays at interchange points are eliminated as freight moves from origin to destination under a single service plan and under the control of one transportation management system. One set of operating procedures applies to the entire trip. Equipment and motive power are supplied by one carrier, avoiding conflicts in priorities common to interline service. Once gateways are eliminated, the service is no longer in danger of being held hostage to the competing revenue requirements of two carriers."[5]

[3] Application, Effect on Adequacy of Transportation, at 22.

[4] Application, Verified Statement of Stephen C. Tobias, at 6-7.

[5] Application, Verified Statement of Thomas L. Finkbiner, at 7-8.

Second, new commercial opportunities:

- "New single-line routes mean new commercial opportunities for the customers of CSX and NS. Over 1,850 shippers have submitted letters or statements supporting the Application, and many of them emphasize the new business opportunities that will be afforded by the expanded CSX and NS rail networks."[6]

- "[B]oth NS and CSXT will have a presence in almost every major urban market in the eastern half of the United States. In the aggregate, then, the Conrail transaction will produce expanded market opportunities for both suppliers and users of coal, and it will help those rail customers remain competitive in the global marketplace."[7]

Third, efficiency gains:

- "More direct routes mean fewer train miles. The elimination of interchange reduces switching costs. More efficient equipment utilization means lower car ownership costs. Substantially more rail service will be produced with fewer management personnel, which translates into savings in general and administrative costs. All of these cost savings are unambiguous public benefits because fewer resources will be consumed in providing freight transportation service."[8]

- "NS, as a single operator, will be able to integrate the railroad and overcome the operating and capital investment differences which exist today between Conrail and NS."[9]

Fourth, enhanced competitiveness:

- With respect to rail versus rail competition, "[r]ailroads are at their best when it comes to single line moves that provide greater efficiency and improved service. . . . [This transaction] is crucial to our ability to meet the future needs of customers who are traditional rail users."[10] With respect to rail versus motor carrier competition, "[t]he Conrail transaction creates rail systems directly linking the Northeast with the Southeast and with the Kansas City Gateway, that will allow us to attract many customers that do not currently ship by rail."[11] And with respect to rail-to-truck versus motor carrier competition, "[t]he larger network and increased ability to offer single line service created by this transaction means that we will have more

[6] Application, Introduction, at 3.

[7] Application, Verified Statement of John William Fox, at 20.

[8] Application, Introduction, at 4.

[9] Application, Verified Statement of Stephen C. Tobias, at 6-8.

[10] Application, Verified Statement of L.I. (Ike) Prillaman, at 5.

[11] *Id.*

opportunities to compete by combining our rail service with truck service at one or both ends."[12]

- Based on diversion studies, "NS will gain revenues of $190.6 million in diversions of existing rail traffic from other carriers"; "NS will gain an additional $101.0 million in coal revenues"; and "NS will gain additional revenues of $269.1 million in diversions from existing highway traffic."[13] With respect to rail diversions, "[m]ost of the diversions will be the result of improved single system service by NS, including route extensions to Kansas City, as well as the linking of the existing NS system in the Midwest and Southeast to those portions of [Conrail] that are being operated by NS."[14] With respect to highway diversions, "56% is generated by new single system service and the remainder is projected from NS's plans to develop new intermodal services on the [Conrail] lines to be operated by NS."[15]

These enumerated benefits from single-line service were consistent with my long-term strategy for Norfolk Southern to address customer needs while growing revenues from existing and potential markets and reducing operating costs. I was confident that the Conrail Transaction would directly further Norfolk Southern's strategic plan by improving its service product, market access, operating efficiency, and competitiveness, as discussed above.[16] And, the Conrail Transaction functioned as intended. As I testified before the STB in 2004, "the transaction has lived up to the [Norfolk Southern] board's expectations. . . . Perhaps most importantly, the transaction resulted in two competitively balanced rail systems serving the eastern United States .

---

[12] *Id.* at 6.

[13] Application, Market Impact Analyses, at 81. And, these conclusions were conservative estimates, not assuming any market or traffic growth since the base year.

[14] Application, Verified Statement of William E. Ingram, at 5.

[15] *Id.*

[16] *See, e.g.*, Rip Watson, *NS Merger To Raise Revenue 50 Percent*, JOC (Apr. 23, 1997), *available at* http://www.joc.com/ns-merger-raise-revenue-50-percent_19970423.html. *See also* Charles V. Bagli, *Rival Railroads Agree on Conrail's Assets*, N.Y. TIMES (Apr. 9, 1997) (quoting David R. Goode) ("Norfolk Southern will reach important new markets and provide new and better services for customers"), *available at* http://www.nytimes.com/1997/04/09/business/rival-railroads-agree-on-conrail-s-assets.html?_r=0.

. . [and] has created vigorous new rail-to-rail competition throughout the former Conrail territory" as a result of expanded single-line service.[17]

Other contemporaneous public statements by Norfolk Southern similarly reinforce that expanded single-line service was the critical justification for and benefit of the Conrail Transaction. At times, such statements regarding single-line service were intended to emphasize the pro-competitive, public interest benefits of the Conrail Transaction for shippers and the national economy. For example, in testimony before Congress, I stated:

> [The Conrail Transaction] will provide the benefits of long-haul, single-line rail transportation service for shippers throughout the region, and will make the economy more efficient and competitive. . . . The Northeast is a fabulous consumer market, it is a fabulous manufacturing area, and goods move back and forth between the Northeast and the Southeast. This [transaction] will enable both Norfolk Southern and CSX to provide single-line service both ways on that corridor, and goods move in major ways in that corridor, and we are going to be able to provide faster, more efficient service as a result of having single-line service, and we are going to compete actively for that business, and that is good news for the shippers throughout the Southeast.[18]

At other times, such statements regarding single-line service were intended to emphasize the financial and commercial benefits of the Conrail Transaction for Norfolk Southern. For example, in remarks at a 1997 Financial Analysts Meeting, my colleague Henry C. Wolf, then-Executive Vice President of Finance for Norfolk Southern, announced:

> [It] is important for us to focus on the strategic opportunity for growth that this transaction offers us. First and foremost, this means revenue growth. The Conrail lines that will be operated by Norfolk Southern will extend our market reach to new and important markets. It will allow us to expand our single line service and focus on markets that

---

[17] Christopher Dinsmore, *Norfolk Southern, CSX request end of Conrail breakup oversight*, THE VIRGINIAN PILOT (May 4, 2004) (quoting David R. Goode), *available at* https://www.ble-t.org/pr/news/pf_headline.asp?id=10320.

[18] *Conrail Merger Implications, Special Hearing before a Subcomm. of the S. Comm. on Appropriations*, 105th Cong. (Mar. 20, 1997) (testimony of David R. Goode), *available at* https://www.gpo.gov/fdsys/pkg/CHRG-105shrg47739/html/CHRG-105shrg47739.htm.

> may not have been fully developed. . . . [W]e expect that this transaction will initially increase our railway operating revenues by more than 50 percent, based on our analysis of revenues generated in the past. As we develop the North-South markets for intermodal and conventional traffic, and increase our role in the East-West markets between the Midwest and Northeast, we are projecting incremental growth in railway revenues to be about $132 million in 1998, $316 million in 1999 and $511 million in the year 2000.[19]

And, it was not just Norfolk Southern who trumpeted single-line service. In its various decisions related to the Conrail Transaction, the STB also explicitly acknowledged and agreed that single-line service was one of its primary justifications and benefits:

- "[A] prime objective of the proposed Conrail Acquisition is the ability to maximize single-line service. This would enable complete control of train movements by a single carrier, and would result in simplified record keeping and reduced time loss in the interchange of cars. Single-line service permits greater flexibility to freely change train priorities in reaction to market demands without the need to coordinate with other railroads, such as a terminal operator located in the middle of the route."[20]

- The Conrail Transaction "permits both CSX and NS to offer new and efficient single-line service in competition with motor carriers and with each other to thousands of shippers that received only joint-line service before. The transaction should lead to improved service and reduced transit times for thousands of shippers throughout the Eastern United States. This will permit these two carriers to divert a significant amount of traffic from the nation's highways. These opportunities will also spur both CSX and NS to make substantial new investments in improving rail infrastructure. CSX plans to invest $ 488 million, while NS plans to invest $ 729 million in new rail property and equipment due to this transaction. Indeed, several line construction projects that we previously authorized are already well under way. These important public interest benefits of increased competition, new single-line routes, reduced highway traffic, and increased capital investment in needed facilities, are largely uncontested."[21]

---

[19] *Remarks by Henry C. Wolf*, Financial Analysts Meeting, Chase Manhattan Bank New York (Apr. 23, 1997).

[20] *CSX Corp. and CSX Transp., Inc., Norfolk Southern Corp. and Norfolk Southern Ry. Co. – Control and Operating Leases/Agreements – Conrail Inc. and Consolidated Rail Corp.*, FD No. 33388, 1998 STB LEXIS 1549, at *93 (STB served May 22, 1998).

[21] *CSX Corp. and CSX Transp., Inc., Norfolk Southern Corp. and Norfolk Southern Ry. Co. – Control and Operating Leases/Agreements – Conrail Inc. and Consolidated Rail Corp.*, FD No. 33388, 1998 STB LEXIS 1559, at *102-04 (STB served July 23, 1998).

Such statements by the STB, praising the efficiencies of single-line service, were consistent with its prior approval of mergers and other control transactions. For example in *Union Pacific Corp., Union Pacific R.R. Co., and Missouri Pacific R.R. Co. – Control and Merger – Southern Pacific Rail Corp., Southern Pacific Transp. Co., St. Louis Southwestern Ry. Co., SPCSL Corp., and The Denver and Rio Grande Western R.R. Co.*, the STB "agree[d] with applicants . . . that the merger of all of the SP railroads into UPRR will facilitate the achievement of the benefits of the UP/SP merger by allowing UP/SP customers to enjoy the full benefits of single-line service and single-system service."[22] The Conrail Transaction allowed customers to enjoy the full benefits of single-line service and single-system service on an even larger scale.

Thus, the public record demonstrates that it was "uncontested," to quote the STB,[23] that Norfolk Southern's expanded ability to offer single-line service was the key justification for and benefit of the Conrail Transaction. As described by Norfolk Southern and the STB, this expanded ability to offer single-line service would not only benefit customers, with more reliable service, new commercial opportunities, efficiency gains, and balanced competition, but would also benefit Norfolk Southern, with efficiency gains yielding reduced operating costs as well as competitive gains yielding increased revenues.

B. Norfolk Southern's Financing Plan

Norfolk Southern's financing plan for the Conrail Transaction provides further evidence that the transaction was premised on Norfolk Southern's continued ability to offer single-line service.

---

[22] FD No. 32760 (Sub-No. 23), 1997 STB LEXIS 244, at *16 (STB served Sept. 26, 1997).

[23] *See supra* note 21.

Norfolk Southern acquired its share of Conrail for $5.7 billion, of which $4.3 billion was raised in the public debt markets.[24] At the time, this was the *largest* single investment grade public corporate debt offering ever sold in the U.S. market.[25]

Norfolk Southern's aggressive financing for the Conrail Transaction assumed the realization of the public and private interest benefits, as described above in Part A. In the Application, Norfolk Southern projected annual net operating benefits of $553 million from the Conrail Transaction, with $254 million from net operating expense reductions and $299 million from net revenue gains as a result of its expanded ability to offer customers improved rail service, new commercial opportunities, increased efficiencies, and enhanced competitiveness through single-line hauls.[26]

The fairness opinions rendered to Norfolk Southern for the Conrail Transaction by Merrill Lynch & Co. and J.P. Morgan & Co. Inc. were each premised on the "capital expenditures reductions and revenue enhancements expected to result from the operation of certain Conrail assets by NS."[27] These projected capital expenditures reductions and revenue enhancements resulted primarily from Norfolk Southern's expanded ability to provide customers with more consistent service, reduced transit times, expanded market access, increased operating efficiencies, and balanced competition through single-line hauls, as catalogued above in Part A. And as I previously attested, Norfolk Southern's "willingness to invest $5.7 billion to control the Penn Lines (not including future planned capital investments) is perhaps the best evidence of our

[24] Application, Verified Statement of Henry C. Wolf, at 2.

[25] *Id.*

[26] Application, Financial Consideration; Operating Economies; Increase in Traffic, Revenues, and Earnings, at 19.

[27] *See* Application, Verified Statement of Jack Levy; Application, Verified Statement of James L. Hamilton.

confidence in the market opportunities the transaction offers to us"[28] as a result of Norfolk Southern's newfound ability to "provide single-line service between all locations on NS's 14,300 mile system (including New Orleans, Memphis, Kansas City and Atlanta) and all locations on the 7,180 miles of the Penn Lines, including the major markets of northern New Jersey, Philadelphia, Pittsburgh and the Monongahela coal fields."[29] Similarly, Mr. Wolf explained that the "enthusiastic response to our debt issues demonstrates the confidence of the financial markets . . . that the financial results of the transaction will be positive for Norfolk Southern creditors and shareholders alike."[30] Thus, Norfolk Southern's aggressive financing for the Conrail Transaction reinforces that the company (and the investment community at large) was confident about the financial benefits that would accrue as a result of its expanded ability to offer customers improved rail service, new commercial opportunities, and increased efficiencies through single-line hauls.

And this confidence was not misplaced. As noted above in Part A, Norfolk Southern projected revenue growth as a result of the Conrail Transaction of $316 million in 1999, the first full year after consummation of the transaction, and $511 million in 2000. These figures were off the mark—they significantly *underestimated* the company's actual revenue growth as a result of the benefits accruing to customers from single-line hauls, including more consistent service, reduced transit times, expanded market access, and increased operating efficiencies, all of which produced a more competitive Norfolk Southern system:[31]

---

[28] Application, Verified Statement of David R. Goode, at 14-15.

[29] *Id.* at 13.

[30] Application, Verified Statement of Henry C. Wolf, at 7 (emphasis added) (noting Norfolk Southern's aggressive plans to repay the acquisition debt, in part, from "strong earnings growth and enhanced cash flows from the Conrail lines").

[31] *See* Form 10-K, Railway Operating Revenues, Norfolk Southern Corp., SECURITIES AND EXCHANGE COMMISSION (filed Mar. 8, 2001).

Year	Projected Revenue Growth (in millions)	Actual Revenue Growth (in millions)	Variance
1999	$316	$988	213%
2000	$511	$917	80.1%

As the company concluded in its second annual progress report filed with the STB in 2001, "[b]ecause of increased single line service [and] operating efficiencies, NS reports new or improved marketing developments,"[32] translating directly into significant revenue growth that outpaced Norfolk Southern's own expectations.

C. Norfolk Southern's Capital Investments

Norfolk Southern's capital investments following the Conrail Transaction provide further evidence that the transaction was premised on Norfolk Southern's continued ability to offer single-line service.

As described in the Application, "within three years of the integration, CSX and NS expect to make substantial capital investments to implement the integration *over and above the capital investment they and Conrail would otherwise expect to make*. The increase in revenues and efficiencies that will be realized by the expanded CSX and NS systems will offset the cost of these investments."[33] It is worth pausing to dissect this statement: (1) Norfolk Southern planned significant capital investments throughout its new network to fully provide customers with the benefits of single-line hauls, including more consistent service, reduced transit times, expanded market access, increased operating efficiencies, and balanced competition; and (2) these capital investments were essentially self-funded by the financial benefits accruing from such single-line

[32] *CSX Corp. and CSX Transp., Inc., Norfolk Southern Corp. and Norfolk Southern Ry. Co. – Control and Operating Leases/Agreements – Conrail Inc. and Consolidated Rail Corp. [General Oversight]*, FD No. 33388 (Sub-No. 91), 2001 STB LEXIS 949, at *27-28 (STB served Dec. 13, 2001).

[33] Application, Effect of Increase in Total Fixed Charges, at 21.

hauls. As I stated in my Chairman's Letter to Norfolk Southern's 1997 Annual Report, "[t]hese expenditures illustrate the extent of our commitment to the success of this transaction."[34]

So, what exactly were these capital investments? Norfolk Southern designed a "series of route and terminal improvements targeted at creating a free flowing network between the CR routes it operates and existing Norfolk Southern lines. This integration of routes, which also is being carried out by CSX, is the key to meeting both carriers' promise of more competition coupled with more single system service."[35] In the 1997 press release for the Conrail Transaction, Norfolk Southern disclosed its intent to "invest more than $700 million in construction and improvement projects to allow seamless movement of freight between Conrail routes operated by NS and the current NS system and better connections with other railroads, such as Union Pacific and Illinois Central," again emphasizing that "[t]his integration of routes is the key to delivering more competition coupled with more and better single system service."[36] Even the STB acknowledged that as a result of its "new and efficient single-line service," Norfolk Southern was "spur[red]" to invest $729 million.[37]

Over a three-year period beginning in 1998, this $729 million was budgeted to include $145 million for corridor upgrades, $100 million for improvements of mechanical facilities, $98 million for new equipment purchases, $70 million for improvements of former Conrail routes, and $25 million for computer hardware and software projects necessary to integrate the Conrail

---

[34] 1997 Annual Report, Chairman's Letter, Norfolk Southern Corp., *available at* http://globaldocuments.morningstar.com/documentlibrary/document/308b24856d30d8bf.msdoc/original.

[35] Application, Verified Statement of James W. McClellan, at 26.

[36] *CSX and Norfolk Southern File Application for Historic Restructuring of Eastern Rail System*, Press Release (June 23, 1997).

[37] *CSX Corp. and CSX Transp., Inc., Norfolk Southern Corp. and Norfolk Southern Ry. Co. – Control and Operating Leases/Agreements – Conrail Inc. and Consolidated Rail Corp.*, FD No. 33388, 1998 STB LEXIS 1559, at *102-04 (STB served July 23, 1998).

Transaction.[38] Below is a more detailed look at just some of the investments Norfolk Southern made throughout its new network in order to fully provide its customers with the benefits of single-line service:[39]

- On the Southern Tier Route, serving mainly automotive and intermodal traffic from Cleveland, OH to Croxton Yard, New Jersey, Norfolk Southern made investments in additional capacity in Croxton Yard, new connections in Buffalo, NY, and general track and bridge rehabilitation along the route.[40]

- On the Penn Route, serving a diverse mix of automotive, chemicals, coal and ore, general merchandise, intermodal, and steel traffic from Chicago, IL to three eastern anchors (Northern New Jersey, Philadelphia/Southern New Jersey, and Wilmington/Baltimore/Washington, D.C.), Norfolk Southern made substantial investments in additional track capacity in Newark, NJ and Harrisburg, PA, double-stack clearance in the Pattenburg Tunnel between Bethlehem, PA and Northern New Jersey, and expanded or improved intermodal terminals in Northern New Jersey and Harrisburg, PA.[41]

- On the Southwest Gateway Route, serving mainly automotive, chemicals, general merchandise, and intermodal traffic from Kansas City, KS to Pittsburgh, PA, Norfolk Southern made investments in additional track capacity in Attica, IN and in new connections in Sidney and Tolono, IL.[42]

- On the Shenandoah Route, serving mainly coal, general merchandise, and intermodal traffic from New Orleans, LA to New York/New Jersey, Norfolk Southern made investments in additional track capacity in Bristol and Crockett, VA and double-stack clearance between Riverton Junction and Roanoke, VA.[43]

- Norfolk Southern also constructed new connections specifically designed to enable efficient, reliable single-line service for all traffic at various locations including

---

[38] 1997 Annual Report, Norfolk Southern Corp., *available at* http://globaldocuments.morningstar.com/documentlibrary/document/308b24856d30d8bf.msdoc/original.

[39] *See, e.g.*, Second General Oversight Report of Norfolk Southern Corp. and Norfolk Southern Ry. Co., *CSX Corp. and CSX Transp., Inc., Norfolk Southern Corp. and Norfolk Southern Ry. Co. – Control and Operating Leases/Agreements – Conrail Inc. and Consolidated Rail Corp. [General Oversight]*, FD No. 33388 (Sub-No. 91) (NS filed June 1, 2001) ("Second Report").

[40] Application, Verified Statement of James W. McClellan, at 26-28.

[41] *Id.* at 28-30; Application, Verified Statement of D. Michael Mohan, at 37-40.

[42] Application, Verified Statement of James W. McClellan, at 32-34.

[43] *Id.* at 36-38.

Alexandria, IN, Butler, IN, Oak Harbor, OH, Vermillion, OH, Columbus, OH, and Bucyrus, OH.[44]

In 2004, the STB acknowledged Norfolk Southern's "very substantial capital investments in the former Conrail properties" since 1998:

> Major projects have included: new intermodal facilities in Rutherford, PA, Maple Heights, OH, and at the former Navy base in Philadelphia, PA; an expansion of NS's yard in Croxton, NJ; major improvements in coal lines and facilities on the former Monongahela Railroad in central Pennsylvania; other major improvements in NS's yards at Enola, PA, and in Buffalo, NY; an increase in the weight limits on lines on the Delmarva Peninsula from 263,000 pounds to 286,000 pounds; and a major reconfiguration of NS's track structure through Cleveland. And, NS . . . spent . . . almost $ 95 million annually on program rail, tie and ballast program work on former Conrail lines."[45]

Norfolk Southern had envisioned many of these capital investment projects for several decades prior to the Conrail Transaction as part of its long-term strategy to enhance its business mix; but, "it was impossible to make the required capital investment until we could predict future traffic growth with greater certainty. The [Conrail Transaction] gives us the confidence to go forward."[46] As noted in the Application by James W. McClellan, then-Vice President Strategic Planning for Norfolk Southern, as a result of the Conrail Transaction, Norfolk Southern's "[i]nvestment capital and service can flow to almost all markets in the East, unchecked by artificial barriers of corporate boundaries and the restrictions of divergent corporate strategies."[47] Thus, Norfolk Southern's substantial capital investments following the Conrail Transaction underscore the fact that Norfolk Southern was confident about the manifold benefits accruing to

---

[44] Application, Verified Statement of D. Michael Mohan, at 40.

[45] *See also CSX Corp. and CSX Transp., Inc., Norfolk Southern Corp. and Norfolk Southern Ry. Co. – Control and Operating Leases/Agreements – Conrail Inc. and Consolidated Rail Corp. [General Oversight]*, FD No. 33388 (Sub-No. 91), 2004 STB LEXIS 665, at *51 (STB served Oct. 20, 2004).

[46] Application, Verified Statement of James W. McClellan, at 36-37.

[47] *Id.* at 25.

customers from single-line hauls, including more consistent service, reduced transit times, expanded market access, increased operating efficiencies, and balanced competition, as well as the financial benefits accruing to Norfolk Southern from single-line service as its system became more competitive.

1. Enola Yard Case Study

Enola Yard serves as a compelling example of the investments that were enabled and justified by the Conrail Transaction. As a result of the Conrail Transaction, Norfolk Southern significantly rehabilitated and expanded Enola Yard in order to provide customers with improved service, reduced transit times, and increased operating efficiencies through single-line hauls.

Due to declining traffic levels in Enola Yard, Conrail had closed major portions of the yard in the mid-1980s (the eastbound hump yard) and mid-1990s (the westbound hump yard and the steel car shop). Under Conrail's control just prior to the Conrail Transaction, Enola Yard had ceased to be a bio-directional major hump yard facility. Enola Yard was only used to conduct small-scale levels of swapping blocks, classification switching, and staging unit coal trains. Under Conrail's control just prior to the Conrail Transaction, Enola Yard only had a classification capacity of approximately 125 cars per day.

As part of the Conrail Transaction, Norfolk Southern acquired control of Enola Yard. Based on Norfolk Southern's multi-modal analyses of traffic levels, yards, and operations, a classification capacity of approximately 125 cars per day was grossly inadequate; for, Norfolk Southern intended to handle at Enola Yard the traffic moving to and from Reading and Philadelphia, PA as well as southern New Jersey, which traffic previously was handled at Allentown or Conway, PA. Norfolk Southern's analyses indicated that Enola Yard would need a classification capacity of approximately 600 cars per day.

Norfolk Southern needed to increase capacity at Enola Yard in order to fully achieve the benefits of single-line hauls, including improved service, reduced transit times, and increased operating efficiencies, made possible by the Conrail Transaction. As stated in Norfolk Southern's 2001 internal Authorization for Expenditure, *Rehabilitate Enola Yard*, increased capacity at Enola Yard "is an important capability that will allow an efficient north-south service to thrive on what was an east-west oriented railroad":

> By increasing Enola capacity, circuitous car routings and excess car handlings can be avoided. [As estimated in 2001, t]he daily savings of having Enola capacity available are 53,000 car miles, 4.4 million gross ton miles, and nearly 500 car handlings. . . . The resultant reduction in train starts also contributes to reduced crew and locomotive costs.

Increased capacity at Enola Yard "enables Norfolk Southern to streamline routings between certain origins and destinations, while enhancing the quality of service Norfolk Southern offers."[48]

Accordingly, beginning in 2001, Norfolk Southern implemented a multi-phase project to rehabilitate and expand Enola Yard.[49] In Phase I, Norfolk Southern modified a portion of the westbound hump to create a 15-track flat switching yard and a 13-track block swapping facility. These improvements increased classification capacity at Enola Yard to 600-700 cars per day. In Phase II, Norfolk Southern installed additional track, including crossover track, in order to further increase classification capacity at Enola Yard to 1,200-1,400 cars per day; and, Norfolk Southern implemented car retarders and semi-automatic process controls in order to improve the safety of operations at Enola Yard. In Phase III, Norfolk Southern upgraded semi-automatic

---

[48] *NS investment Boosts Capacity, Employment at Enola Yard*, Press Release (Apr. 24, 2001).

[49] *See also Norfolk Southern Plans To Greatly Increase Capacity at Enola Yard*, CANADIAN SHIPPER (Apr. 27, 2001), *available at* http://www.canadianshipper.com/transportation-and-logistics/norfolk-southern-plans-to-greatly-increase-capacity-at-enola-yard/1000022528/.

process controls to fully-automatic process controls in order to further improve the safety of operations at Enola Yard.

Today, Enola Yard is one of Norfolk Southern's major rail classification hump yards, serving a mix of coal and general merchandise traffic.

2. Intermodal Case Study

Intermodal also serves as a particularly illustrative case study with respect to the investments that were enabled and justified by the Conrail Transaction. As a result of the Conrail Transaction, Norfolk Southern created an entirely new intermodal network with expanded capacity and increased access in order to offer customers a quality service product.

Norfolk Southern's new intermodal network was just not possible under the pre-Conrail Transaction joint line service. Developing an intermodal market in a particular corridor requires the delivery of a quality product through consistent and reliable service in order to build customer trust and foster market growth.[50] "As long as one carrier receives a relatively small amount of the revenue because it has a short haul, there is no way such a carrier can devote the time and resources to provide the fast and reliable transit times demanded by intermodal shippers."[51] Based on its geographic considerations, Conrail's operating plan, capital investment schedule, and long-term strategy did not prioritize developing intermodal traffic on the north-south corridor.[52] This directly "frustrated Norfolk Southern's ability to develop effective north-south intermodal service jointly with Conrail."[53]

However, as a result of the Conrail Transaction:

---

[50] Application, Verified Statement of Thomas L. Finkbiner, at 4.

[51] Application, Verified Statement of L.I. (Ike) Prillaman, at 6.

[52] *Id.* at 4-5.

[53] *Id.* at 6.

> [S]ingle line intermodal service linking Norfolk Southern's network with Conrail's markets will overcome the impediments associated with existing NS-Conrail joint line routes described above. Norfolk Southern will pursue an intermodal commercial strategy that is consistent over the long term. It also will provide sufficient line and terminal capacity to accept growth in these new single line markets while continuing to meet customers' service expectations on existing business.[54]

As noted above, Norfolk Southern projected revenues of approximately $133 million from truck-to-rail diversions specifically due to its single-line intermodal service.[55] Based on the increased intermodal traffic which Norfolk Southern projected to capture as a result of the Conrail Transaction, the company proposed intermodal capital investments of approximately $200 million at various locations.[56] For example, Norfolk Southern added capacity at Chicago, IL, Croxton, NJ, Harrisburg, PA, and Toledo, OH through expanded or replacement intermodal terminals.[57]

The fingerprints of the Conrail Transaction are still visible in Norfolk Southern's more recent intermodal investments. Norfolk Southern has made substantial investments in the Crescent Corridor, a $3 billion public-private partnership creating high-capacity intermodal routes from the Southeast to the Northeast, as well as in the Heartland Corridor, a $290 million public-private partnership creating efficient routing between the Port of Virginia and the Midwest to include raising tunnel clearances to accommodate double-stack intermodal trains. Both the Crescent Corridor and Heartland Corridor allow Norfolk Southern to continue to offer customers a quality service product and to capitalize on the efficiency and competitive gains from its expanded single-line intermodal service, which was initially made possible by the

---

[54] Application, Verified Statement of Thomas L. Finkbiner, at 7.

[55] *Id.* at 9.

[56] *Id.* at 37-40.

[57] *See, e.g.*, Second Report.

Conrail Transaction. Norfolk Southern now operates the most extensive intermodal network in the eastern U.S.

I do not provide these case studies to emphasize the rehabilitation of Enola Yard over other capital improvement projects or to emphasize intermodal over other segments of Norfolk Southern's business mix. Rather, I believe they serve as two illustrations that Norfolk Southern's substantial investments across its entire network, for the benefit of all transported commodities, in the wake of the Conrail Transaction were premised on the manifold benefits accruing to customers from single-line hauls, including more consistent service, reduced transit times, expanded market access, increased operating efficiencies, and balanced competition, as well as the financial benefits accruing to Norfolk Southern from single-line service as its system became more competitive.

D. Establishment of the Shared Assets Areas

The structure of the Conrail Transaction provides further evidence that the transaction was premised on Norfolk Southern's continued ability to offer single-line service.

As part of the Conrail Transaction, three Shared Assets Areas ("SAAs") were established in North Jersey, South Jersey/Philadelphia, and Detroit. The establishment of these three SAAs stands in stark contrast, and as a limited exception, to the overwhelming majority of asset disposition in the Conrail Transaction. The overwhelming majority of Conrail assets were divided cleanly between CSX and Norfolk Southern. Only in these three discrete SAAs were assets jointly owned by CSX and Norfolk Southern.

The benefits of the Conrail Transaction—that Norfolk Southern and the STB touted as a result of expanded single-line service—would have been completely undermined if the SAAs had not been as limited as they were and are. Norfolk Southern was willing to establish these

limited and carefully managed SAAs to address the unique competitive circumstances created by the Conrail Transaction in these particular locations, despite the difficulties associated with jointly owning the infrastructure in these particular locations. However, this willingness does not mean that Norfolk Southern expected or assumed the risk that its ability to provide single-line service *elsewhere* in its network would be jeopardized, as that would have jeopardized the entire portfolio of public and private interest benefits from the Conrail Transaction and, by extension, Norfolk Southern's financing and capital improvement plans in connection with the transaction.

CONCLUSION

The Conrail Transaction remains the most enduring legacy from my extensive career in the rail industry. The Conrail Transaction fundamentally restructured the competitive landscape of the rail industry in the eastern U.S. by creating two strong and well-balanced competitors with expansive networks that permit efficient single-line service. As such, the Conrail Transaction was a critical component of the "resurgence of rail" in the eastern U.S.

Speaking from my personal experience with the Conrail Transaction, as confirmed by statements from the public record, the Conrail Transaction was fundamentally premised on Norfolk Southern's assumption that it would retain the continued ability to provide single-line service. Operating under this assumption, Norfolk Southern secured one of the largest debt financing arrangements, at the time, for the transaction and made substantial capital investments throughout its network, both with full confidence that the expense of such financing and investments would be recouped from the revenue growth as a result of the improved service product, expanded market access, increased operating efficiency, and enhanced competitiveness enabled by more single-line hauls. The limited extent of the SAAs only confirms that Norfolk

Southern expected that it would retain the continued ability to provide single-line service throughout the overwhelming majority of its network.

The STB's proposed competitive switching rules directly contradict Norfolk Southern's core assumption that it would retain the continued ability to provide single-line service. Thus, the STB's proposed rules ignore Norfolk Southern's investment-backed reliance on the perpetuation of the existing regulatory regime.

VERIFICATION

I, David R. Goode, verify under penalty of perjury that I formerly served as the Chairman, President, and CEO of Norfolk Southern Corporation, that I have read the foregoing document and know its contents, and that the same is true and correct to the best of my knowledge and belief.

Executed on 10/20/2016

David R. Goode

BEFORE THE
SURFACE TRANSPORTATION BOARD

STB Ex Parte No. 711 (Sub-No. 1)

RECIPROCAL SWITCHING

VERIFIED STATEMENT OF JOHN H. FRIEDMANN

My name is John H. Friedmann. I currently serve as Vice President Strategic Planning for Norfolk Southern Corporation ("NS"). I have served in my present position since 2008 and have been employed by NS since 1994. During my 22 years with NS, I have held a variety of planning, operating, commercial, and administrative positions, including Assistant to the Chairman, Assistant Vice President Strategic Planning, Assistant Vice President Short Line Marketing, and Division Superintendent. Since 2006, my responsibilities have focused primarily on tactical and strategic asset acquisitions, line rationalizations, and other transactions designed to preserve and improve the efficiency and capacity of NS's network. Most recently, I actively participated in the negotiations that resulted in NS's acquisition of approximately 280 miles of the Delaware and Hudson Railway Company, Inc.'s line as well as in the negotiations that resulted in NS's transfer of operations of over 300 miles of NS's line in West Virginia and Ohio ("West Virginia Secondary Line") to a short-line operating subsidiary of Watco Companies.[1] As such, I am intimately familiar with NS's decision-making process regarding network investment.

---

[1] For purposes of this statement, such transfers of operations to a short-line carrier will be referred to as "short-lining" and the applicable variants thereof.

I hold a Bachelor's of Science in Industrial Management from Carnegie Mellon University and an MBA from the University of Pennsylvania.

Based on my extensive and in-depth knowledge of NS's network and its investment decision-making process, I believe that the Surface Transportation Board's ("STB") proposed rules for granting requests for reciprocal switching would fundamentally alter NS's investment decision-making process and adversely affect the levels of investment and quality of service throughout NS's entire network.

I. STB'S PROPOSED RULES FOR RECIPROCAL SWITCHING WOULD FUNDAMENTALLY ALTER NS'S INVESTMENT DECISION-MAKING PROCESS AND ADVERSELY AFFECT ITS NETWORK.

A. NS's Current Investment Decision-Making Process.

NS periodically undertakes a comprehensive tactical and strategic analysis of its network to determine where to invest. At a high level, the calculus of this analysis is relatively simple. NS identifies which lines need and can economically support capital reinvestment, on the one hand, and which lines should be short-lined, discontinued, or abandoned, on the other hand, because the economics do not support capital reinvestment. Thus, NS's current investment decision-making process minimizes the likelihood of stranded assets.

The economics of a line or line segment are never a foregone conclusion, given the risk of changes in traffic volumes, traffic flows, or overall market conditions. However, these risks are manageable. NS accounts for these risks by requiring a sufficient return on its investment in a line or line segment within a reasonable time. As such, NS's current investment decision-making process ensures that NS makes sound, informed investment decisions that promote its

financial health and shareholder value, overall network efficiency and capacity, and a quality service product.[2]

B. Significance of Anchor Customers for NS's Network.

It is important to emphasize that NS's investment decision-making process employs a *network* approach, because a line is assigned 100% of the contribution earned from the traffic originating or terminating on it. Anchor Customers, defined as significant customers concentrated at the end of a line, play a key role in this decision-making process. First, as a local effect, the contribution earned from an Anchor Customer justifies infrastructure and other investments to operate and maintain the line that extends to reach that Anchor Customer. Second, as a broader effect, the contribution earned from an Anchor Customer justifies infrastructure and other investments along the supporting interior portions of the Anchor Customer's route that other customers located along that route can use and benefit from and that generally contribute to overall network efficiency and capacity.

At a more theoretical level, the significant contribution earned from Anchor Customers helps NS recover the fixed and variable costs incurred to run a railroad, specifically, that portion of the railroad serving the Anchor Customer. Such cost recovery is critical to NS's ability to invest in the efficiency and capacity of its network in order to provide a quality service product to customers. Accordingly, any reduction in the contribution earned from Anchor Customers would have profound adverse effects for NS's network and NS's entire customer base, because it would alter the calculus necessary to justify certain infrastructure and other investments.

---

[2] *See, e.g.*, Norfolk Southern Corp. 2015 Annual Report on Form 10-K, SECURITIES AND EXCHANGE COMMISSION 7 (filed Feb. 8, 2016) ("We have invested and will continue to invest in various projects and corridor initiatives to expand our rail network to increase capacity and improve transit times, while returning value to shareholders.")

NS's network includes Anchor Customers in most geographic regions. For example, Anchor Customers in the Mobile, AL area provide contribution that helps support portions of a secondary main line in NS's network, the north-south line connecting the Mobile area to the rest of NS's system. As highlighted in red in the map below, the portion of this line extending to the Mobile, AL area is a "finger" in NS's network and depends on on-line traffic for its existence. As another example, Anchor Customers in the Kansas City, KS area provide contribution that helps support portions of another extension of NS's network, the east-west line connecting the Kansas City area to the rest of NS's system, as also highlighted in red in the map below.

Fingers in NS's Network

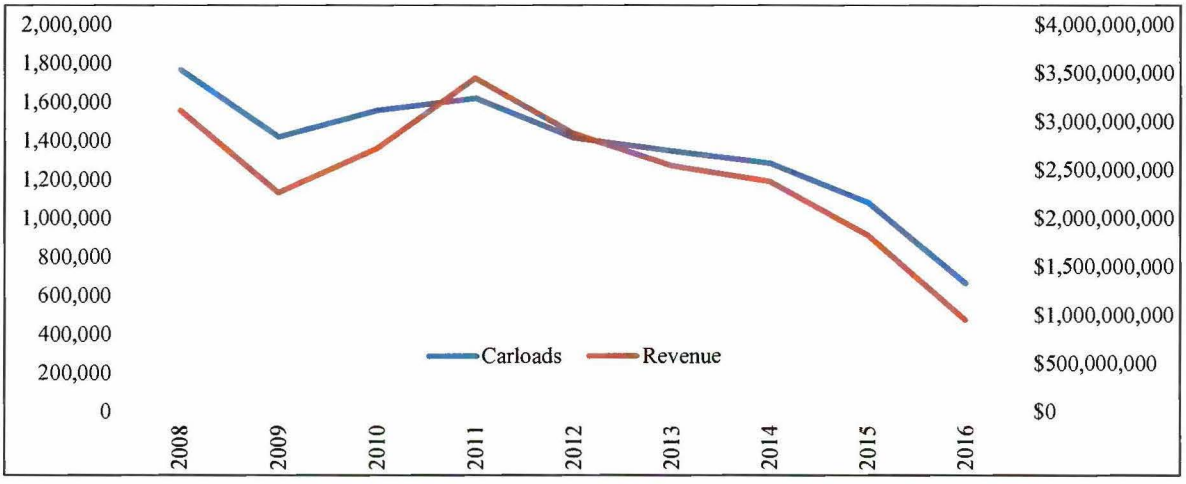
Thus, the efficiency and capacity of NS's network depends, in large part, on the contribution earned from Anchor Customers. The contribution earned from Anchor Customers is critical to NS's ability to prudently invest in maintaining and improving the outer reaches of its network as well as the interior of its network.

1. Current Environment

Today, railroads operate under challenging market conditions. I really only need to say one word on this point—coal. But, I will elaborate. At its high water mark in 2008, coal accounted for 24% of total NS traffic and 29% of total NS revenues, with NS transporting approximately 1.8 million carloads of coal equal to approximately $3.1 billion in revenue.[3] Coal-producing mines and coal-consuming plants often served as Anchor Customers in various regions of NS's network. And for many years, the contribution from these coal Anchor Customers justified infrastructure and other investments along these Anchor Customers' routes—such as sidings, double track, signal systems, etc.—that benefited these Anchor Customers, other customers located along their routes, and overall network fluidity.

However, as shown in the graph below, the number of coal carloads transported by NS, and the associated revenues, began to decline after 2008.

NS Coal Carloads and Revenues



This decline was largely a result of global oversupply and a strong U.S. dollar, with respect to export coal, and a result of low natural gas prices, unseasonably warm weather conditions, and

[3] Norfolk Southern Corp. 2008 Form 10-K, SECURITIES AND EXCHANGE COMMISSION 7 (filed Feb. 18, 2009)

high inventory stockpiles, with respect to utility coal.[4] In 2015, coal accounted for only 14% of total NS traffic and 17% of total NS revenues, with NS transporting approximately 1.1 million carloads of coal amounting to approximately $1.8 billion in revenue.[5] From 2008 to 2015, the percentage of total NS revenues earned from coal traffic had fallen by over 40%.

Bottom line, NS—like most other railroads—has lost significant contribution over the last seven years due to strong coal market headwinds. Contribution from coal Anchor Customers no longer justifies the same levels of infrastructure and other investments along their routes. For example, NS's recent decision to cease operations and to short-line its West Virginia Secondary Line directly resulted from the loss of coal contribution. Simply put, as coal Anchor Customers generate relatively less contribution, NS's investment decision-making process more often concludes that capital reinvestment, along routes serving predominantly coal traffic, is not supported by the economics.

C. Unintended Adverse Consequences of STB's Proposed Rules.

In order to "ensure the development and continuation of a sound rail transportation system with effective competition among rail carriers and with other modes, to meet the needs of the public,"[6] the STB must not take any actions that threaten railroads' ability to recover their fixed and variable costs and to earn sufficient returns on investments. As discussed below, the STB's proposed rules for reciprocal switching contain this precise threat.

The STB's proposed rules for reciprocal switching would have unintended adverse consequences for NS's investment decision-making process and, by extension, for NS's entire network. As I noted at the outset, NS's investment decision-making process is predicated on the

---

[4] *See, e.g.*, Norfolk Southern Corp. Q4 2015 Earnings Call (Jan. 27, 2016).
[5] Norfolk Southern Corp. 2015 Form 10-K, SECURITIES AND EXCHANGE COMMISSION 7 (filed Feb. 8, 2016)
[6] 49 U.S.C. 10101(4).

ability to adequately assess and manage risk. The STB's proposed rules would inject a significant amount of risk into NS's investment decision-making process.

1. Effect on NS's Investment Decision-Making Process

The STB's proposed rules would create the risk of a substantial loss in the contribution earned from line-haul traffic (assuming that the method of access pricing would not adequately compensate a railroad for its lost contribution). This loss in contribution could occur either as a result of: (a) the conversion of line-haul revenues to a lower switching fee; or (b) general rate compression. Accordingly, NS would no longer be able to predict the contribution earned from the traffic on a line with the appropriate level of certainty necessary to support the same levels of infrastructure and other investments on that line. The STB's proposed rules would convert traditionally low-risk investment propositions into high-risk propositions.

NS would need to modify its investment decision-making process to compensate for this heightened risk, either by discounting the projected contribution based on a calculated risk factor or by accelerating the time period within which capital reinvestment would need to be recovered. There are two points to emphasize. First, such modification would be required as a result of the *risk* of a substantial loss in contribution earned from a customer as a result of the STB's proposed rules, regardless of whether the customer actually petitions the STB for forced switching. Second, such modification would be a matter of fiduciary duty, as NS's shareholders require a fair return on investment.

Under these more stringent standards, far fewer lines in NS's network would qualify for reinvestment, not to mention the many types of improvements that NS regularly makes such as the addition of track, sidings, and supporting yards. Thus, the STB's proposed rules would skew NS's investment decision-making process disproportionately in favor of short-lining,

discontinuing, and abandoning lines. To put it bluntly, NS would be required to cede markets and significantly shrink its network.

And, this smaller network would create a negative feedback loop. As NS downsizes its network and concentrates its traffic flows, NS would face a considerable risk of rail-to-rail diversions and rail-to-truck diversions as a result of deteriorating service due to the loss of single-line movements and the increase in handlings by multiple carriers. Such diversions would result in even less contribution assigned to NS's lines, further reducing the economic support for that reduced network.

Thus, the STB's proposed rules for reciprocal switching, an endogenous force, would severely jeopardize the efficiency and capacity of NS's network and the quality of NS's service product. This outcome directly conflicts with the mission of a regulator.

2. Effect on NS's Entire Network

Fundamentally altering NS's investment decision-making process is not just a theoretical concern. This change has significant adverse effects for NS's entire network, as demonstrated by considering how NS's altered investment decision-making process would account for the contribution earned from Anchor Customers.

Again, the STB's proposed rules would create the risk of a substantial loss in the contribution earned from Anchor Customers. As a result of any loss or even the potential loss in the contribution earned from an Anchor Customer, NS's altered investment decision-making process would assign significantly less contribution overall to the line extending to the Anchor Customer. This would have two adverse effects on NS's network:

First, the contribution earned from the Anchor Customer would no longer justify NS's prior levels of investment along the supporting interior portions of the Anchor Customer's route.

Thus, NS would need to reduce its investments along the supporting interior portions of the Anchor Customer's route. For example, NS may not have made the significant capacity investments that it put into the Mobile line during the past decade if the contribution from Anchor Customers was in question. This reduction in investment would harm not only the Anchor Customer but also all of the intermediate customers located along the Anchor Customer's route. Reduced investment generally translates into reduced network efficiency and capacity, ultimately resulting in an inferior service product for the Anchor Customer and the intermediate customers on its route.

Second, the contribution earned from the Anchor Customer may no longer justify NS's investment in the portion of the line connecting the Anchor Customer to the rest of NS's network. Thus, NS could be forced to create an island operation to serve the Anchor Customer. An island operation exists where NS serves a customer between an origin and an interchange (or between a destination and an interchange), and those two endpoints of service are otherwise severed from the rest of NS's network. Accordingly, the economic impacts of the STB's proposed rules would result in investment decisions that poke new holes in NS's network, which has been carefully designed to provide extensive single-line service for the benefit of customers.

And if an island operation were created, there would be two economic forces at play. First, to match the reduced contribution earned from the Anchor Customer, NS would need to reduce its level of investment in the island operation, ultimately resulting in an inferior service product for the Anchor Customer. Second, as compared to an integrated operation, the operating costs of the island operation would be significant, due to the need to maintain dedicated equipment and crews to serve the discrete, isolated island. These increased operating costs either would need to be passed on to the Anchor Customer in the form of higher rates or would further

reduce the contribution earned from the Anchor Customer, thereby again resulting in a reduction in the level of investment and quality of service for the Anchor Customer.

Just to be clear, these two adverse network effects apply *regardless* of whether the Anchor Customer actually petitions the STB for forced switching. As explained above, NS's investment decision-making process would be severely distorted by the *mere risk* of a substantial loss in the contribution earned from an Anchor Customer as a result of the STB's proposed rules. There is always some degree of risk from changing market conditions in running a railroad, like in any business. But such risk typically is exogenous, rather than imposed and heightened by the very regulator charged with protecting the national rail transportation system. Unlike NS's rightsizing of its coal network as a rational, tailored response to changing coal market conditions, the STB's proposed rules would alter NS's investment decision-making process for major portions of its network, forcing NS to further downsize its network in order to compensate for the heightened regulatory risk and uncertainty related to the *potential* for changing traffic flows and traffic volumes—without any guiding principles as to the occurrence, location, and extent of these changes. Under such conditions, there is no guarantee that NS's downsized network would be able to serve customers and the public interest.

CONCLUSION

The STB stands on a precipice. As the STB itself has recognized, its proposed rules would place "downward pressure on the rates of those shippers who are eligible" to seek a forced reciprocal switching remedy.[7] At the same time, the STB is rightly "concerned" about the adverse impact of its proposed rules on those shippers who cannot seek a reciprocal switching

[7] Notice of Proposed Rulemaking, *Petition for Rulemaking To Adopt Revised Competitive Switching Rules*, STB Ex Parte No. 711 (Sub-No. 1), at 14-15 (served July 27, 2016).

remedy.[8] The STB must look beyond the parochial interests of a small subset of shippers. The STB must not ignore the interconnected network aspect of freight rail transportation. Any short-term pricing relief for a small subset of shippers as a result of the STB's proposed rules would be dwarfed by the long-term harm to all shippers from discouraged investments, inferior service, and a weaker network.

I have personally overseen numerous tactical and strategic line transactions designed to preserve and improve the efficiency and capacity of NS's network. The STB's proposed rules would fundamentally alter NS's investment decision-making process by requiring NS to account for the heightened and substantial regulatory risk of lost contribution from line-haul traffic. This would skew NS's investment decision-making process in favor of a much smaller network. NS's altered investment decision-making process also would result in reduced levels of investment, both at the outer edges of NS's network and along the interior, supporting regions of NS's network. Reduced investment generally translates into an inferior service product and a less reliable and resilient network.

Although I can attest to the eventuality of these adverse network effects, it is impossible to quantify the *magnitude* of these effects, given the interconnectivity of NS's network and the multitude of decisions made on a daily basis within that network. If the STB marches forward with its proposed rules, only time will tell the true harmful effect on the overall level of investment in the network. But it will be substantial.

[8] *Id.* at 15.

VERIFICATION

I, John H. Friedmann, verify under penalty of perjury that I serve as Vice President Strategic Planning of Norfolk Southern Corporation, that I have read the foregoing document and know its contents, and that the same is true and correct to the best of my knowledge and belief.

Executed on October 19, 2016

John H. Friedmann

BEFORE THE
SURFACE TRANSPORTATION BOARD

STB Ex Parte No. 711 (Sub-No. 1)

RECIPROCAL SWITCHING

VERIFIED STATEMENT OF JEFFREY H. SLIGER

My name is Jeffrey H. Sliger. I currently serve as Assistant Vice President Transportation Network for Norfolk Southern Corporation ("Norfolk Southern"). I have served in my present position since March of 2016 and have been employed by Norfolk Southern since 1981. During my 35 years with the company, I have held a variety of positions, including most recently General Manager of Norfolk Southern's Eastern Region and Division Superintendent in Knoxville, TN; Dearborn, MI; Fort Wayne, IN; and Decatur, IL. My current responsibilities include overseeing Norfolk Southern's Service Design, Joint Facilities, Operations and Locomotive Control, and Crew Management Center Departments. I attended the University of Tennessee, Knoxville and received my degree in Business Administration and Marketing.

Based on my experience and understanding of Norfolk Southern's network management and service design processes, I believe that the Surface Transportation Board's ("STB") proposal to impose forced switching on certain rail traffic would negatively impact Norfolk Southern's operations. Injecting new switching events, let alone new switching events between railroads, at locations across the system will slow the velocity of Norfolk Southern's network, increase the variability of network operations, and degrade service.

Although the STB proposes a case-by-case approach, the effects of granting each individual request will not be confined to those individual locations or to the shippers availing themselves of the regulatory process. Instead, the impacts will accumulate with each successive award, and disruptions at individual locations will cascade to other areas. These accumulative events will be occurring while the landscape is ever changing, adding to the complexity of being able to accurately forecast the effect. The STB will not be able to predict or foresee the consequences of its decisions, nor will the problems that develop be simple to unravel. In short, the STB's proposal is a recipe for a slower and less reliable rail network.

I. THE GOAL OF NETWORK PLANNING AND SERVICE DESIGN IS TO OPTIMIZE SERVICE FOR ALL SHIPPERS USING AVAILABLE RESOURCES.

A. Norfolk Southern's Network and the Principles that Guide Service Design

To understand the negative impacts that necessarily would result from implementation of the STB's proposal, it is important to start with an understanding of the complexity of Norfolk Southern's operations. Norfolk Southern's system is comprised of 20,000 route miles in 22 states, serving nearly 19,000 unique origin and destination pairs and connecting with all six other Class 1 railroads as well as several hundred regional and short line railroads. Within this system, Norfolk Southern essentially runs three different networks: (1) a premium service network, which consists primarily of intermodal and automotive traffic, typically moving between terminals designed to load and unload such traffic; (2) a unit train network, in which dedicated trains carry a single commodity between a single origin and destination; and (3) a general merchandise carload network that handles thousands of shipments every day. All three networks rely upon the same set of limited resources, including the capacity of our rail lines, yards, and other infrastructure, locomotives, railcars, and crews, and other assets necessary to run these operations. These resources are right-sized based on forecasts for customer demand.

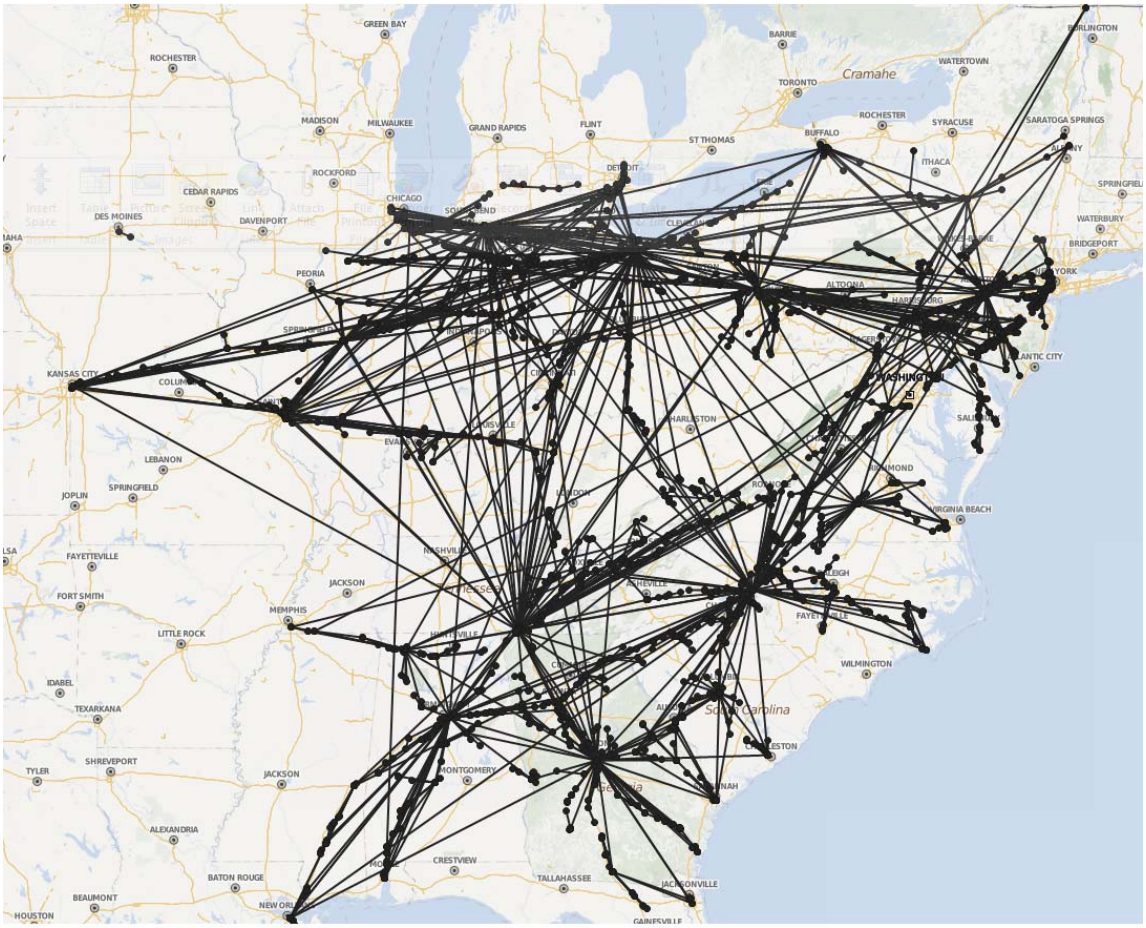
Our planning efforts are aimed at placing the right resources in the right place based on predictions of these traffic flows so that Norfolk Southern can maximize the use of its resources and provide the best possible service quality and reliability to all of our customers. Our service design team is responsible for creating and updating an operating plan to accomplish those twin goals of operating efficiently and meeting customer needs. Often those needs pull in many directions. Our customers have different transportation demands and priorities; much like the airline industry, it would be impossible for Norfolk Southern to provide each individual customer with dedicated service between its desired origin and destination at a time of its choosing and still have rail as a cost competitive option. As a result, it takes coordinated judgment to maximize the capacity and efficiency of the Norfolk Southern network.

This planning process extends down to the individual car level – every car on Norfolk Southern has a trip plan. In our merchandise network, rail shipments are gathered by local trains and brought to the origin serving yard. From there, the car is taken to a classification yard, where it is sorted, or "classified," into a group with other cars headed for the same intermediate or final destination. These groups of cars are referred to as "blocks." Depending on the type of yard, the sorting process involves either sending the cars over a hump or flat switching them (whereby crews use locomotives to push and pull the cars) onto classification tracks. Each of these classification processes is considered a "handling." This process is later repeated at intermediate terminals as the shipment progresses across the network ("intermediate handlings"). When the shipment reaches the destination terminal, it is handled for the final time, either for delivery to the consignee via a local train or to a connecting carrier at an interchange point.[1]

[1] This process is explained in more detail in Norfolk Southern's video "Want to learn more about how a carload moves through our rail network," available at www.youtube.com/watch?v=oDTnIJsENwc.

The total number of classifications and blocks that Norfolk Southern is capable of making is constrained by the infrastructure and resources at individual facilities, including the employee time it takes to switch and construct such blocks. Consequently, we prioritize those blocks that maximize the efficiency gains to the network.

Figure 1
Norfolk Southern's Merchandise Blocking Network (2016)



Norfolk Southern serves more than 19,000 unique origin-destination pairs, and shipments are grouped into almost 1,300 road blocks and over 4,400 local blocks. **Figure 1** graphically illustrates Norfolk Southern's blocking scheme in its merchandise network. Each individual line represents a group of traffic that is classified and assembled at one endpoint of the line and then moved across the network to the other endpoint. Many blocks originate or terminate at

interchange locations with other carriers, such as Kansas City, the western-most location on our system. Merchandise trains are often made up of multiple blocks of traffic, each headed for a different ultimate destination but sharing a common portion of the journey. Similarly, a single carload may be part of multiple blocks during the course of its journey across the network. For example, a carload moving from an origin near Atlanta, GA, to a destination near Memphis, TN, may be gathered locally in Atlanta and classified into a block moving from Atlanta to Sheffield, AL, where it is then humped and classified into another block moving from Sheffield to Memphis.

Norfolk Southern dedicates significant resources, both in terms of personnel and sophisticated technology, to developing these trip plans. The plans rely in large part on data about historic train movements as well as forecasts for future traffic flows. When operations run smoothly, it is in part a testament to the success of these intense planning efforts.

Several principles guide Norfolk Southern's efforts to design and run as efficient and customer-focused network as possible. These principles include maximizing long-hauls, minimizing car handlings and switches, minimizing the number of times a car must be handled in a yard, maximizing train lengths, consolidating traffic flows, and generating efficiencies in any way possible. All of these principles seek to best utilize our resources, including infrastructure, and reduce the time required for shipments to move through our network. In an asset-reliant service like rail, shipment velocity is a key driver of greater efficiency (and, correspondingly, lower costs). The faster shipments cycle, the higher the utilization of railcars, locomotives, terminals, and other assets. Conversely, as network velocity slows, resource needs increase, and customers inject additional shipments into the system to compensate for the elongation of their

supply chains. Adding more cars and locomotives back into the system further slows shipments – something we know from past experience in the industry.

B. Norfolk Southern's Operating Plan Informs Resource and Investment Decisions.

Norfolk Southern's service design plans drive resource and investment decisions and placement. Getting the proper assets – cars, locomotives, and crews – in the right place takes substantial lead time, even for short-term tactical decisions. Locomotives must be repositioned across a network that runs 24 hours a day, without any down time. Moreover, crews are not fungible. Even if one crew district has extra employees available to cover a shortfall in another nearby district, those employees can be deployed in the other district only if they have been trained and qualified to operate over the new territory. And, in some cases, such reassignments may be prohibited by existing labor agreements.

Norfolk Southern's resource planning groups also use the operating plan to drive longer-term investments, such as equipment acquisitions, leases, and personnel hiring. These decisions must be made many months or even years in advance. For example, it takes at least six to nine months from the decision to add additional conductors in a location to advertise, hire, train, and qualify new employees on that territory. Engineers take even longer, between twelve and fifteen months. Further, new engineers are trained from the existing qualified conductor pool, so we must have sufficient conductors to add significantly to our engineers. Depending on production capacity, new locomotives may need to be ordered several years in advance of actual receipt.

Finally, the operating plan and expected needs of specific customers also inform a variety of investment and strategic decisions, ranging from constructing a new rail siding to expanding or idling a major yard. Of course, construction of additional infrastructure and capacity is even

more time-consuming and costly than adding other resources, as well as more risky because once constructed those assets are fixed and cannot be redeployed to other parts of the system.

Overall, due to the different lead-times required to add resources and infrastructure, Norfolk Southern has limited options to respond in the short-term to increased resource demands. When traffic shifts suddenly and there are not enough resources in the right places, history teaches us that there will be operating problems and service failures. Norfolk Southern's experience with unexpected increases in crude oil and other volumes on our Northern Region in 2014 illustrates this point. Crew and power shortages, especially on our Chicago Line between Chicago, IL, and Cleveland, OH, attributable to those unexpected volumes caused congestion and degraded service. The many measures we implemented in response, including temporary crew relocations, ramping up new hiring, traffic rerouting, etc., eventually brought resources back into balance, but only after a significant period of time.

C. Service Issues in One Area Spread Across the Network.

Such unanticipated shifts in traffic flows also have serious consequences for Norfolk Southern's system as a whole. When traffic exceeds *planned* levels at specific locations, it taxes the crews, locomotives, and infrastructure on which that traffic relies. Those resources, however, are equally vital to serving other customers in the area, leading to congestion. The impacts of constrained capacity and slower velocity radiate outward geographically to other parts of the network. Returning again to 2014, the congestion attributable to increased volumes on our Northern Region affected the velocity and fluidity of Norfolk Southern's entire system.

The interdependence of the rail network by now is well understood. The STB acknowledged in its proposal that:

> [a]s has been demonstrated by real-world instances, operational issues in the gateways and terminals can easily spread to other parts of the rail network. The service crises of the late 1990s and the winter of 2013-2014 are stark reminders

> that local congestion can turn quickly into regional and national backlogs, affecting shippers of all commodities.

Reciprocal Switching, Ex Parte 711 (Sub-No. 1), at 17 (STB served July 25, 2016) ("Proposal"); *see also Policy Statement on Implementing Intercity Passenger Train On-Time Performance and Preference Provisions of 49 U.S.C. § 24308(c) and (f)*, Ex Parte 728 (STB served Dec. 28, 2015) ("Past rail service crises, such as that during the late 1990s, have demonstrated that congestion at one location can adversely affect the rail network at large."). Similarly, Amtrak's Blue Ribbon Panel recently noted that "even relatively small delays" in the Chicago terminal area "can have a ripple effect throughout the U.S. rail network." Report of the Amtrak Chicago Gateway Blue Ribbon Panel, at 36 (Oct. 2015), *available at* https://www.amtrak.com/ccurl/873/180/Chicago-Gateway-Amtrak-Blue-Ribbon-Panel-Final-Report.pdf.[2]

For all our planning efforts, Norfolk Southern recognizes that many things that affect our network, such as weather or changes in economic conditions, are beyond our control. As a result, Norfolk Southern's service design efforts can be best described as our attempt to plan (and deploy) our resources based on anticipated conditions and to minimize, wherever possible, those sources of volatility over which we exert some measure of control. The STB's proposal attacks that very premise by introducing increased inefficiencies and sources of volatility into the network, in the form of additional handlings and new interchange events.

[2] *See also* United States Department of Transportation, Office of Inspector General, CR-2008-076, "Root Causes of Amtrak Train Delays," at 19 (Sept. 8, 2008) ("The rail network operates 24 hours a day, 7 days a week. Delays in one part of the network can set off another type of delay later on in the network, which creates a 'ripple' effect. . . . It can take up to 5 days, and sometimes up to 1 month, to restore service to normal operations after an unplanned disruption. Unlike the aviation system, which allows planes to be repositioned overnight, there is no 'down time' within which trains can be repositioned.").

II. INCREASING THE NUMBER OF HANDLINGS NEGATIVELY IMPACTS SHIPMENT VELOCITY AND SERVICE AND WOULD UNRAVEL NORFOLK SOUTHERN'S SERVICE DESIGN EFFORTS.

A. Car Handlings Are Responsible for the Large Majority of Shipment Transit Time.

As referenced above, in our merchandise network a car will be handled at origin, at destination, and (depending on its trip plan) at intermediate terminals as it moves through the network. These handlings account for the majority of the time that a typical shipment spends in transit. Each handling event consumes resources and introduces delays in transit time for the traffic. In fact, as shown below, a typical general merchandise shipment will spend only somewhere around a quarter of its total transit time in road train service.

Figure 2
Percentage of Total Transit Time for Norfolk Southern Merchandise Shipments

As **Figure 2** shows, the time that a car spends, or "dwells," at yards as a result of intermediate handlings represents the largest component of the transit time. The STB's proposal would

directly and adversely affect this intermediate handling component by increasing the number of car handlings per shipment.

B. Norfolk Southern's Studies Demonstrate the Close Relationship Between Intermediate Handlings, Velocity, and Service Quality.

We know that an increase in car handlings will have a negative impact on Norfolk Southern's entire system because of the correlations between intermediate handlings, shipment velocity, and our service. To quantify velocity, we measure the number of line haul miles a carload moves across the Norfolk Southern system in a day (line haul miles per day, or "LHMpD"). This metric includes train speed during the road haul portion of the movement and all dwell and handling time at intermediate yards, passing sidings, and interchange points, as well as non-handling delays such as crew change, inspection, and fueling activities.

Minimizing the number of intermediate handlings is critical to optimizing shipment velocity. **Figure 3** below illustrates that each additional intermediate handling required per shipment reduces the average velocity of those shipments.

Figure 3
Shipment Velocity and Number of Intermediate Handlings (2014-2016)
{{

}}

This relationship makes sense because each handling requires additional time during which the car is not moving towards its destination – the greater that intermediate delay, the less distance the car averages in a given day. And as shown, adding just a single intermediate handling into an otherwise efficient train-load movement (with no intermediate handlings) has a significant impact on shipment velocity and service: injecting that complexity into the movement would reduce the shipment's velocity by almost 50 percent.

Cognizant of this relationship, Norfolk Southern looks for opportunities in its operating plan to minimize the number of intermediate car handlings. As shown below, Norfolk Southern has reduced the average number of intermediate handlings from approximately {{ }} at the beginning of 2015 to approximately {{ }} in mid-2016. Reflecting the inverse relationship

with intermediate handlings, average shipment velocity has increased during that same period from approximately {{ }} LHMpD to almost {{ }} LHMpD.

Figure 4
Line Haul Miles Per Day and Average Intermediate Handlings (2014-2016)

{{

}}

Indeed, removing handlings from the network speeds up even those movements that require no handling themselves. **Figure 5** again plots the average number of intermediate handlings on Norfolk Southern's network since 2014, this time against the average shipment velocity of just those shipments without any intermediate handlings. Since the beginning of 2015, as intermediate handlings have decreased, average shipment velocity has increased, from approximately {{ }} LHMpD to over {{ }} LHMpD – demonstration that the network effects of intermediate handlings impact even unrelated traffic.

Figure 5
Line Haul Miles Per Day for Shipments with No Intermediate Handlings and Average Intermediate Handlings (2014-2016)

{{

}}

Of course, intermediate handlings are not the only factor that influences shipment velocity. Norfolk Southern also seeks to increase LHMpD by reducing the amount of dwell per handling, reducing dwell unrelated to handling, and increasing train speed.

But the demonstrable inverse relationship between intermediate handlings and shipment velocity has substantial consequences for the service that Norfolk Southern provides its customers. Shipment velocity is highly correlated with service performance, as measured by Norfolk Southern's composite service metric.[3] **Figure 6** illustrates this correlation since the start of 2014.

[3] Norfolk Southern's composite service metric is made up of three components: train performance, connection performance and plan adherence. **Train performance** refers to how well a train runs in relation to its schedule. **Connection performance** refers to how consistently

Figure 6
Composite Service Metric and LHMpD (2014-2016)

{{

}}

Such a correlation is largely intuitive. When trains run on time and yard activities and connections occur as planned, velocity is high. Conversely, when trains are delayed or annulled, or cars are delayed in yards or do not run on planned trains, velocity slows. Tying these concepts together, an increase in intermediate handlings adds additional work events and more opportunities for failures in plan execution, slowing velocity.

These effects are felt by all customers. Lower shipment velocity does not affect only individual cars. Shipments that continue to run via plan are affected because they move on the same trains, run through the same terminals, share the same limited network capacity, and rely on the same resources as those shipments experiencing additional handlings. Further, Norfolk Southern seeks to maximize LHMpD because higher shipment velocity translates into better

---

shipments make their connections. **Plan adherence** refers to how well a train performs its scheduled activities.

utilization of those resources, in the form of higher equipment turns, fewer locomotive hours, and fewer crew hours. Slower velocity, in turn, consumes greater amounts of all rail resources, including track capacity, and requires shippers to place more cars into the system to make up for longer transit times. When utilization regresses, the entire system runs more slowly, experiences more variation in network operations, and is more vulnerable to localized disruptions.

Overall, higher velocity is vital to Norfolk Southern's ability to attract and retain new business. Norfolk Southern does not have sufficient real estate to expand our infrastructure and existing facilities in most areas. As a result, the capacity of our network rises and falls with velocity. Norfolk Southern must be able to improve velocity in order to achieve and handle growth.

C. Norfolk Southern Seeks Ways to Remove Handlings from the System.

Understanding these effects, Norfolk Southern evaluates ways, both large and small, to eliminate intermediate handlings from the system. A good example of those efforts is Norfolk Southern's recent $160 million expansion of our major classification yard in Bellevue, Ohio.[4] Bellevue sits approximately halfway between New York City and Chicago, at the intersection of five Norfolk Southern lines. This major capital project nearly doubled the prior capacity of Bellevue Yard.

One of the biggest benefits of the new capacity at Bellevue Yard is the ability to classify more freight cars and to build more and longer blocks, reducing the number of handling events required for that traffic. Blocking only increases efficiency if a carrier has (1) sufficient volumes headed to the same subsequent handling location to allow it to build a train that can bypass intermediate yards without classifying that traffic, and (2) the yard capacity to construct such

[4] Bellevue Yard was recently renamed Moorman Yard, but for consistency will be referred to as Bellevue Yard in these comments.

blocks. Bellevue's increased size and throughput allows Norfolk Southern to generate such efficiencies to and from more locations. Additionally, as the number of cars in each existing block increases, fewer blocks are required to fill out each train, meaning those blocks can be grouped to travel longer distances together before they must be split up to go in different directions towards their final destination.

As an example of the reduction in handlings, Norfolk Southern previously had to classify freight headed westward for interchange to Canadian National Railway ("CN") twice in the Chicago area. The traffic first would be classified in Bellevue and put on a train to our yard in Elkhart, IN, then classified again in Elkhart and built into a block to interchange with CN at Kirk Yard. As a result of the expansion project, Norfolk Southern now has the blocking capacity to block this traffic entirely in Bellevue. The train still stops at Elkhart to add additional traffic destined to Kirk Yard, but no additional handling of the interchange traffic from Bellevue is required. That redesigned service cuts out a handling and removes an average of one day from the previous transit time.

Norfolk Southern also looks for ways to make targeted improvements to its operating plan. Norfolk Southern recently began building two new blocks in Fort Wayne, IN, grouping traffic destined for Decatur, IL, and Conway, PA. The Decatur traffic previously moved from Fort Wayne to Elkhart for further classification, while Norfolk Southern sent the Conway traffic from Fort Wayne on to Bellevue for further handling. Because Norfolk Southern has sufficient volumes of traffic in Fort Wayne heading to those locations to build dedicated blocks, Norfolk Southern was able to eliminate a handling and remove circuitous miles from the routing. Norfolk Southern has undertaken a similar effort at Shenandoah, VA, building a new block for Allentown, PA, that allows the traffic to bypass handling in Hagerstown, MD. Norfolk Southern

also recently established Chattanooga, TN, and Bellevue blocks in Roanoke, VA, to bypass classification of cars destined to those locations in Linwood, NC. When Norfolk Southern has sufficient volumes of traffic heading to like destinations to support building these blocks, it can reduce the number of handlings and increase shipment velocity.

D. The STB's Proposal Would Reverse Norfolk Southern's Efforts to Minimize Intermediate Handlings.

The STB's proposal would introduce additional intermediate handling events into the network in the form of new, forced switching with other carriers at some number of unknown locations. Obviously, adding an interchange to a shipment that previously moved direct via a single carrier adds an additional intermediate handling to that service, in the form of that interchange event. But depending on each carrier's operating plan, forced switching may also add new handlings to some traffic beyond just the interchange. Norfolk Southern witness Fred Ehlers explained just such an example in his Verified Statement in Ex Parte 711. For a carload interchanged from CSXT Transportation, Inc. ("CSXT") to Norfolk Southern in Atlanta for delivery in the Atlanta area, Norfolk Southern would need to {{[redacted]}} would be in addition to whatever handling CSXT would undertake to deliver the carload to the interchange location in Atlanta. *See* Norfolk Southern Opening Comments Ex Parte 711 Ehlers V.S. at 15.

Moreover, interchange events often are more complicated than a typical intermediate handling, meaning the effects of the STB's proposal will be even more pronounced. Interchanges require significant coordination between the two railroads involved on issues of timing, location, and infrastructure. Interchange locations vary significantly in their

configuration and capacity to handle additional volumes or particular types of traffic, such as unit trains. *See* Norfolk Southern Opening Comments Ex Parte 711 Ehlers V.S. at 10-22 (detailing unique operating limitations of various interchanges on NS). And a receiving railroad cannot monitor the other carrier's network, leaving its own operations susceptible to unanticipated variability even if the interchange location can handle the interchange volumes.

As a result, each new interchange adds volatility into the network. By volatility, I mean uncertain and changing traffic demands to which Norfolk Southern must react through changes in resource deployment and, potentially, the operating plan itself. For example, **Figure 7** shows the volume of daily interchange traffic that Norfolk Southern received in Chicago from the Belt Railway Company of Chicago ("BRC") during a month-long period this year.

Figure 7
Cars Interchanged From BRC to Norfolk Southern in Chicago (Aug. 23 – Sept. 21, 2016)

{{

}}

The daily volumes varied by more than 500% during the course of a single month, from a low of a little more than {{ }} cars on August 24, 2016, to a high of nearly {{ }} cars on September 10, 2016. These volume fluctuations trigger extra train requirements, placing a significant strain on Norfolk Southern's resources and slowing shipment velocity. Yet the STB's proposal would multiply the amount of traffic (and locations) that would experience these effects.

For all of these reasons, Norfolk Southern has recently undertaken an effort to reduce the volumes it interchanges through intermediate switch carriers by interchanging traffic directly to other carriers where possible. Direct interchanges allow Norfolk Southern to mitigate the impacts of volume fluctuations through greater control of its operations. As a result, Norfolk Southern can better manage and position resources such as crews and locomotives, while also achieving cost savings by avoiding switching charges.

Norfolk Southern also has worked to streamline its interchange operations with other carriers. Norfolk Southern detailed its efforts to consolidate interchanges with CSXT in its prior comments in Ex Parte 711. *See* Norfolk Southern Opening Comments Ex Parte 711 Ehlers V.S. at 10-11. Those efforts continue. In the past few years, Norfolk Southern and CSXT have closed 33 interchanges. Most of these interchanges had minimal volumes, on the magnitude of less than a carload per day. However, because those locations were still open and had traffic, each carrier had to reserve sufficient resources in the area. Those resources have now been redeployed to more effective uses. Conversely, a handful of these locations had more significant volumes, but consolidating traffic flows to other interchange points has allowed the carriers to increase shipment velocity in some cases while also realizing efficiency gains. For example, CSXT and NS now interchange traffic previously interchanged at three different locations

(Marion, IN, Indianapolis, IN, and Muncie, IN) in Anderson, IN, which permits consolidation of traffic from CSXT and several short lines into one interchange, reducing handlings and resource requirements while expediting the traffic. If customers in that area sought forced access under the STB's proposal, they could unbundle this consolidation and reinsert the inefficiencies that the service redesign successfully removed from the system.

Indeed, all of the efforts I've discussed would be unraveled by the STB's proposal. Each granted switching application would add additional handlings to the network, slowing shipment velocity. Some, like in Atlanta, would add significant and unnecessary mileage to the route. Even if the STB restricted forced switching geographically to existing interchange locations, the increased (and variable) volumes across those interchanges would increase the volatility of operations, like we have experienced with the BRC, requiring additional resources and resulting in less efficient operations. The STB's consideration of forcing carriers to switch cars at additional interchange locations not in use today would reverse the efforts that Norfolk Southern has made with other carriers for more efficient and improved customer service, such as in Anderson, IN.

III. BY INJECTING COMPLEXITY INTO THE NETWORK, THE STB'S PROPOSAL WILL HAVE PROGRESSIVE, CUMULATIVE IMPACTS THAT HARM ALL CUSTOMERS.

Amplified complexity and added uncertainty are the bane of good service, operating fluidity, and network resilience. Increased handlings and poor service go hand-in-hand and ripple beyond the narrow confines of a specific movement to harm innocent traffic as well. These hard truths about railroad operations are proven repeatedly by actual events.

The Board hopes to avoid degrading network efficiency by evaluating forced switching arrangements on a case-by-case basis. It aspires to "exercise a greater degree of precision when

mandating reciprocal switching, thus mitigating the chance of operational challenges in a given area." Proposal at 17.

With the utmost respect, based on my 35 years of experience, it is simply inconceivable to me that the STB—with its limited resources and deliberate regulatory process—will be able to keep in check the proven consequences from injecting complexity and uncertainty into a rail network and from reinstating inefficiencies that railroads have worked to streamline, or to react in a timely manner to the near constant fluctuations of demand. And all rail customers will be harmed by any miscalculation.

A. The Negative Impacts of Introducing Even Feasible, Planned Switching Impacts Other Traffic.

Even if the STB were able to anticipate the exact traffic volumes and requirements imposed by each switching application—which it cannot—its proposal would nevertheless generate significant negative effects on all of Norfolk Southern's traffic. As demonstrated above, each successive grant of forced switching would further increase the average number of handlings required per shipment, slowing network velocity and therefore degrading overall service. Car cycle times would increase for the subject traffic as well as other impacted traffic, straining resources across a network that relies upon shared utilization of common resources. Customers would respond by injecting more volume into the system to compensate for longer transit times. Slower shipment velocity would also increase the track capacity consumed by each carload, further affecting the fluidity of the network.

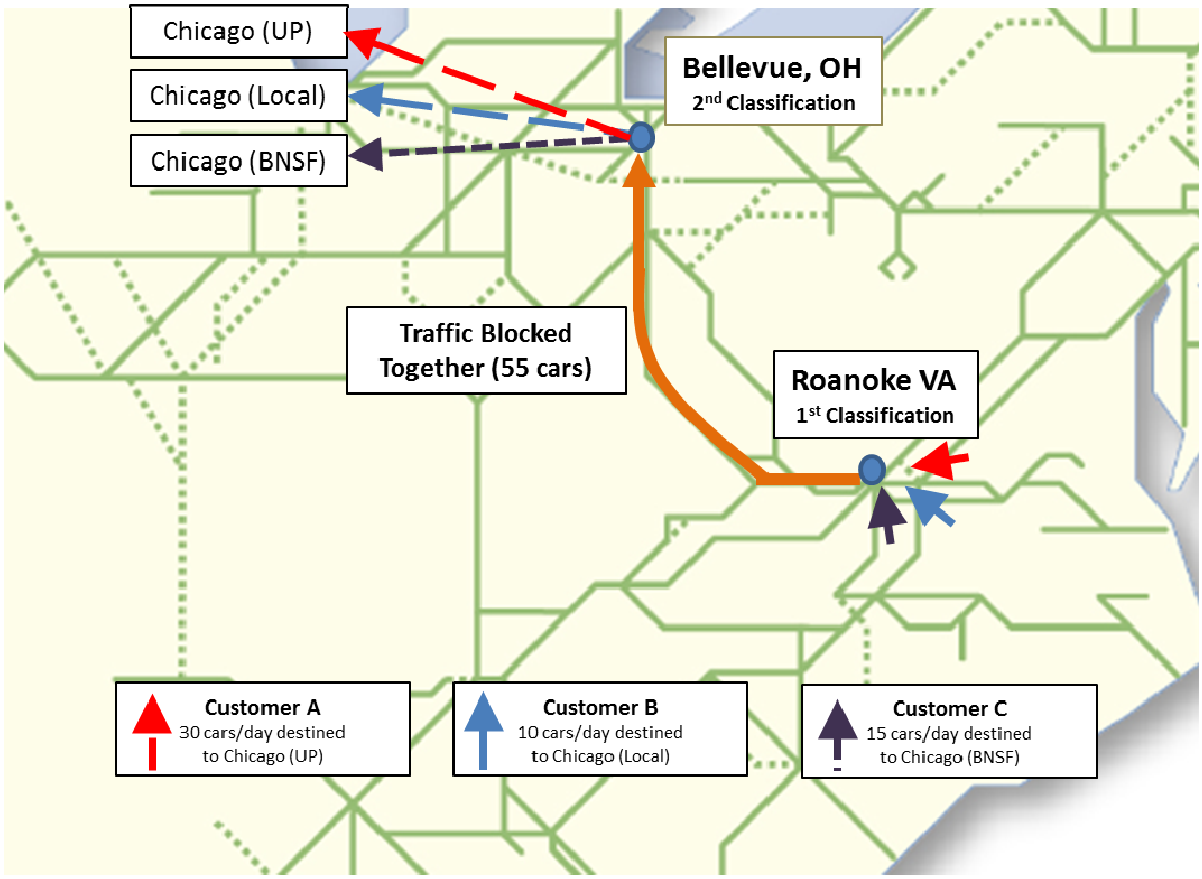
Similarly, additional locomotive and crew resources would be consumed moving the subject traffic to and from interchange locations. For new interchange locations, forced switching would necessarily require the participating carriers to establish new train services that do not exist today, whether between the new interchange and a customer location, a local serving

yard, or a classification yard. Even for existing interchange locations, service would need to be redesigned, and local trains might be required to make additional stops en route to move the subject traffic to and from the interchange. Increased interchange volumes may also necessitate the operation of additional trains and/or require additional track capacity. Consequently, crews and locomotives would not be available for all of their current uses, resulting in less frequent service to customer locations and/or greater delays in transit time for other traffic.

Additionally, by reducing long-haul volumes, the STB's proposal would impair Norfolk Southern's ability to handle non-subject traffic efficiently. As discussed above, the efficiencies Norfolk Southern can achieve are driven by the ability to build blocks of traffic moving between common origins and destinations of sufficient size that they can be grouped together to bypass handling in intermediate yards. But as subject traffic is switched to other carriers, these long-haul volumes would shrink or, at minimum, become less certain. The remaining traffic may be insufficient, or insufficiently predictable, to support continuing to building existing blocks, requiring Norfolk Southern to handle that non-subject traffic more often, with corresponding negative consequences for transit time and service.

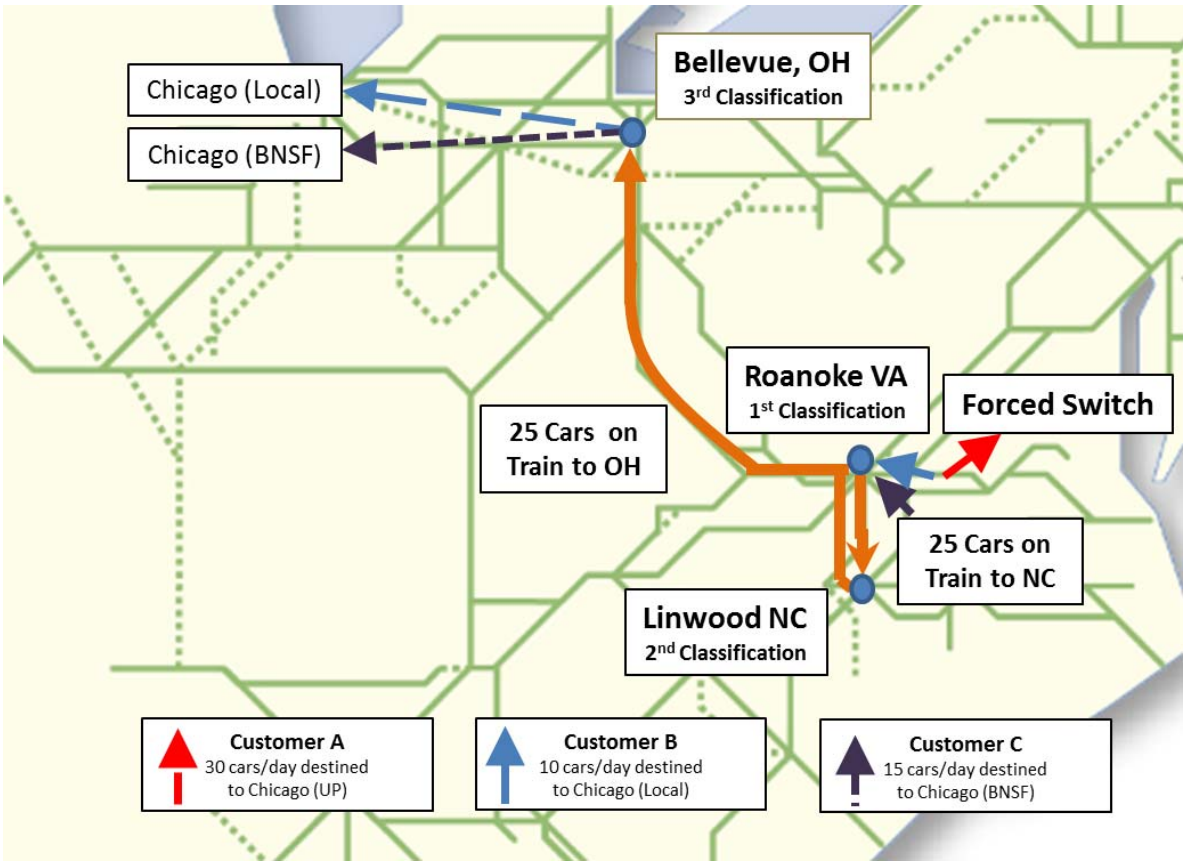
Figures 8 and **9** illustrate this point, taking from the example cited earlier of Norfolk Southern's recent creation of a new block moving from Roanoke, VA, to Bellevue, OH. In **Figure 8**, Norfolk Southern gathers hypothetical traffic from three customers in the greater Roanoke area destined to Chicago, either for interchange or local delivery. After classification, that traffic moves in a solid block between Roanoke and Bellevue, where it is reclassified and split up to move separately to its respective destinations.

Figure 8
Hypothetical Blocking Scheme Before Board Proposal – Roanoke, VA, to Bellevue, OH



By contrast, in **Figure 9**, Customer A takes advantage of the regulatory process to force Norfolk Southern to switch its traffic to another carrier. As a result, that volume is no longer available to combine with the remaining 25 carloads from Customers B and C. Lacking sufficient, predictable volumes to realize efficiencies by creating a sufficiently large single block for Bellevue, Norfolk Southern would instead resume sending those carloads with other traffic to Linwood, NC, where they would be reclassified and combined with additional volumes gathered in Linwood heading to Bellevue. In short, Customer A's decision to seek a forced switch results in an extra handling and longer transit times for Customers B and C to Chicago.

Figure 9
Hypothetical Blocking Scheme After Board Proposal – Roanoke, VA, to Bellevue, OH



Relatedly, carriers in many locations agree to "block swaps," whereby each carrier builds specified blocks of interchange traffic for the other carrier prior to interchanging that traffic to that carrier. Such an arrangement permits the receiving carrier to move that traffic significant distances after the interchange without additional car handlings. Because these blocks provide no benefit to the originating carrier, such agreements are typically reciprocal in nature.

However, if new traffic is added to an existing interchange location, it may frustrate the benefits of those arrangements. For example, Norfolk Southern currently receives pre-blocked traffic from other carriers in Chicago that it is able to move directly to Bellevue Yard for further handling. If another carrier was forced by STB order to switch additional traffic to Norfolk Southern via that interchange, such traffic might not be destined to or handled through Bellevue.

Norfolk Southern then would have two options: (1) add an additional handling event for the whole train in another location, such as Elkhart, to permit classification of the new traffic; or (2) add an entirely new train to serve the interchange in Chicago for the new subject traffic, consuming additional resources and increasing congestion. In either case, the efficiency of Norfolk Southern's operations and the service that Norfolk Southern is able to provide to other customers would be negatively affected.

B. The STB Will Not Be Able to Foresee the Domino Effect of Individual Switching Decisions.

Perhaps the greatest misconception in the STB's proposed case-by-case approach is the implicit assumption that the Board will be able to foresee the traffic flows that will arise under each forced switching application and therefore predict the resulting impacts. The history of the railroad industry, including recent events, disproves any such belief.

At a macro level, Norfolk Southern operated an incredibly different railroad in 2010-2011 than it did in 2012-2013, and conditions are vastly different today from either of those periods. Major shifts in the economy and Norfolk Southern's commodity mix drove significant changes in traffic, from the quick rise and sharp contraction of crude oil traffic to the swift and steep decline in coal volumes. These changes were not foreseen or fully understood until after they had already occurred. Norfolk Southern's network itself also has not remained static. Since 2013, Norfolk Southern has expanded Bellevue Yard while ceasing hump operations in Knoxville, TN, and Roanoke, VA.

On a more granular level, unforeseen fluctuations are even more frequent. Norfolk Southern's customers are susceptible to major economic forces, weather, and other unanticipated changes that affect their transportation requirements. On top of that, their businesses ebb and flow due to a variety of individualized factors, such as specific shifts in market demand,

commodity prices, winning or losing particular contracts, and unanticipated operational issues such as plant failures. As a result, customers' own short-term forecasts about their transportation needs often miss the mark significantly. These inaccuracies are compounded when attempting to predict demand further into the future. Moreover, unanticipated volumes often arise when customers have issues handling their pipeline of traffic. In such cases, the issue is not the total number of carloads but the timing, whereby a customer ships an unusual amount of traffic all at once or is unable to handle incoming traffic, leading to accumulations.

As the examples below demonstrate, in addition to all of the predictable negative consequences that will flow from forced switching events, the inevitable inability to predict switching volumes will result in service issues for other traffic, both locally and more broadly.

1. Local Impacts of Unanticipated Switch Volumes

Unanticipated traffic demands can have serious negative impacts on unrelated customers located in the same geographic area or reliant on the same facilities. Local operations may be sufficiently staffed and have sufficient track capacity to handle normal volumes and demands. However, even one customer experiencing unusual activity can strain available resources. The STB's proposal would impose new demands on individual interchange locations, compounding this risk.

A recent occurrence on Norfolk Southern's Piedmont Division provides a good example. Norfolk Southern delivers traffic originating from a customer located in Canton, OH, to an interchange location in Asheville, NC. The customer unexpectedly had 100 cars (equivalent to five days' worth of traffic) build up in Asheville Yard awaiting interchange. This congestion directly impacted the eight active customers served out of Asheville Yard, because local crews exhausted their hours of service switching the yard and were unable to serve those customers as planned. Asheville Yard itself, which is normally capable of handling this interchange traffic,

ran out of room, requiring Norfolk Southern to set out traffic in sidings short of Asheville due to the congestion.

The ultimate consequence of this backup was that Norfolk Southern was forced to put an embargo in place on the customer temporarily limiting the amount of traffic the customer could send through Asheville. When the embargo is lifted, the customer likely will have backlogged volumes that will be pushed into the network in bunches, leading to further congestion and switching issues. The lasting impacts on network fluidity will take significant time to work through, all arising out of a single customer's interchange traffic.

Another recent example involved private empty equipment returning to a chemical customer location around Toledo, OH. Heavy volumes arose due to a force majeure event affecting a pipeline that normally carried significant quantities of the commodity, leading to an unexpected spike in rail demand. This unanticipated surge caused a capacity pinch whereby the cars accumulated in Homestead Yard in Toledo. As a result, Norfolk Southern did not have space to accept trains arriving at Toledo into the yard as planned, delaying placement of cars for local customers. Additionally, trains originating from Toledo destined for Bellevue were delayed because the capacity constraints prevented trains from being built on time. Those delays, in turn, cascaded into missed train connections and plan disruptions for the affected traffic, further delaying those shipments. This issue also has resulted in service delays to grain customers in Maumee Yard, about fifteen miles away. Norfolk Southern has worked with the customer to attempt to identify solutions, including construction by the customer of additional tracks, but the backlogged volumes will take time to work down.

2. Effects Can Quickly Spread Geographically

While service issues arise locally, in a connected network the effects are difficult to contain locally. Congestion at one location causes Norfolk Southern to hold trains at other

locations, rather than sending them on to further compound the problem. If the issue lingers, these holding locations themselves become congested from the impacted traffic, leading to further ripple effects throughout the system.

For example, for approximately six months in the middle of 2015, one of Norfolk Southern's shippers unexpectedly experienced a strong spike in demand from four customers around Dragon, MS. Traffic volumes increased from averaging around 10-15 cars per day to averaging more than 25 cars per day, with frequent spikes of more than 40 cars a day. As a result, Norfolk Southern had to add numerous extra train sections to its existing Bellevue to Birmingham train on which that traffic moved, disrupting normal operations. When demand exceeds a train's maximum length, some cars must be left behind to wait for the next train, consuming yard space and slowing transit times. Those cars in turn may displace cars intended to move on the following train, perpetuating the oversubscription. Eventually, Norfolk Southern was able to adjust the operating plan and add an additional scheduled train to handle the traffic.

Even once the cars made it to Birmingham, the customers were unable to accept the increased volumes at their facilities all at once. Those cars had to be staged somewhere while awaiting the customer's ability to accept them, so Norfolk Southern stored them at Birmingham Yard and at various locations and sidings outside the yard. Those cars consumed capacity in the yard and on that corridor, impacting yard and train operations, including Amtrak's Crescent service. When those impacts became apparent, Norfolk Southern rerouted the traffic 286 miles out of route to our yard in Sheffield, AL, to be switched and stored awaiting receipt by the customers. Traffic eventually returned to normal levels. But in the end, this one temporary fluctuation ended up requiring Norfolk Southern to redesign its service multiple times and affected multiple yards and numerous other scheduled services.

C. Impacts of STB's Proposal Will Compound

Both of these effects – the immediate service impacts of introducing additional handlings, and the consequences of unanticipated shifts in traffic subject to forced switching – will worsen with each additional grant of forced switching. Each new interchange event mandated by the STB will inject another area of volatility into Norfolk Southern's network. By placing more strain on Norfolk Southern's resources to handle existing traffic, the STB's proposal would both reverse many of the efficiency improvements Norfolk Southern has achieved through service design and make the overall system more susceptible to disruptions, like weather, that are beyond Norfolk Southern's control. Much like with its current operating plan, Norfolk Southern will not be able to predict exactly where and when those events will occur. But that does not make them any less real or certain.

IV. CONCLUSION

For decades, Norfolk Southern has striven with great success to provide the best possible service and reliability to all its customers by reducing handlings, minimizing complexity, and designing its services to maximize the use of our customers' and our own resources. The result has been lower operating costs, lower rates, and a streamlined network that can respond with more agility to unexpected stresses and quickly changing market conditions. The STB's proposal will turn back the clock by injecting complexity and adding intermediate handlings.

And the public will suffer in the end. The data presented above demonstrate that, by introducing forced switching, the STB's proposal would slow our network and reduce the service we are capable of providing to our shippers. A case-by-case analysis of each switching application cannot keep this result in check; the effects of increased car handlings go beyond the affected traffic and will accumulate as more applications are granted. Experience also

demonstrates that introducing more volatility into the system will result in additional instances of acute traffic congestion and service failures, with the potential to spread to the larger network.

Simply put, the STB's proposal would elevate the desires of certain individual shippers over the best interests of all shippers, to the detriment of Norfolk Southern's network as a whole.

Verification

I, Jeffrey H. Sliger, verify under penalty of perjury that I am Assistant Vice President Transportation Network of Norfolk Southern Corporation, that I have read the foregoing document and know its contents, and that the same is true and correct to the best of my knowledge and belief.

Executed on 10/20/2016

Jeffrey H. Sliger

BEFORE THE

SURFACE TRANSPORTATION BOARD

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

RECIPROCAL SWITCHING

VERIFIED STATEMENT

OF

PROFESSOR MARK ARMSTRONG

AND

PROFESSOR DAVID SAPPINGTON

October 26, 2016

Designing Reciprocal Switching Policies in the U.S. Rail Industry

by Professors Mark Armstrong and David Sappington

I. Qualifications.

A. Mark Armstrong.

My name is Mark Armstrong. I am a Professor in the Department of Economics and a Fellow of All Souls College, both at the University of Oxford. Since earning my doctorate in economics from Oxford in 1992, I have served in economics departments in the universities of Cambridge, Southampton and University College London. I am currently co-editor of the *Rand Journal of Economics*, and previously editor and chairman of the *Review of Economic Studies*. I am a Fellow of the British Academy and both a Fellow and Member of Council of the Econometric Society.

My research focuses on industrial organization, including the design of regulatory policy in general and the specification of regulated access prices in particular. I have published many articles in leading journals in the profession and have coauthored a book on *Regulatory Reform: Economic Analysis and UK Experience*. My curriculum vitae appears as an attachment to this report.

B. David Sappington.

My name is David Sappington. I hold the titles of Eminent Scholar and Director of the Public Policy Research Center, both at the University of Florida. Since earning my Ph.D. in economics from Princeton University in 1980, I have served on the faculties of the University of Michigan and the University of Pennsylvania and on the technical staff of Bell Communications Research. I have also served as the Chief Economist for the Federal Communications Commission and as the President of the Industrial Organization Society. I presently hold positions on the editorial boards of five major journals, including the *Journal of Regulatory Economics*, the *Rand Journal of Economics*, and the *Review of Industrial Organization*.

My research focuses on the design of incentive structures, with particular emphasis on the design and implementation of regulatory policy. I have analyzed the strengths and weaknesses of a variety of regulatory policies in different industries and in different countries. I have published more than one hundred and fifty articles in leading journals in the profession and have coauthored a book on *Designing Incentive Regulation for the Telecommunications Industry*. My curriculum vitae appears as an attachment to this report.

II. Purpose and Outline of this Report.

The Surface Transportation Board ("the Board") has instituted a proceeding "to modify the Board's standards for reciprocal switching" (Surface Transportation Board Decision, Petition for Rulemaking to Adopt Revised Competitive Switching Rules, Docket No. EP 711, July 27, 2016 ("STB Decision"), p. 2). We have been asked by Norfolk Southern Railway Company to assess the appropriate design of reciprocal switching policy in the U.S. rail industry, with particular emphasis on the appropriate design of compensation for such switching when it serves the public interest. This report summarizes our assessment.

Section III of this report stresses the importance of differential, demand-based prices for rail transport that allow rail carriers to recover both their variable costs and the very large fixed and common costs that they incur. Section IV observes that the need to modify the Board's historic policy is not apparent, and neither is the associated problem that the Board apparently seeks to resolve. Section V notes that the Board's modified policy may fail to serve the public interest. Section VI explains why the access charges paid for mandated reciprocal switching ("forced access") should preserve contributions to fixed and common costs. Section VII stresses the importance of integrating any forced access policy with other elements of the Board's regulatory policy. Section VIII provides concluding observations.

Our three primary conclusions are as follows.

1. <u>A lack of cases does not signal a need for expanded forced access</u>.

   An absence of shipper petitions for forced access does not imply a need to modify the Board's historic reciprocal switching policy. Rather, an absence of requests can reflect an absence of behavior that warrants modification.

2. <u>Access charges should protect differential pricing and preserve contributions to fixed and common costs</u>.

   In designing the access charges that will be paid for forced access, the Board should employ sound economic principles by adopting access charges that protect differential, demand-based pricing and preserve contributions to fixed and common costs. Such access charges, unlike cost-based access charges, will help to secure ongoing investment in vital rail infrastructure while ensuring that industry costs are minimized.

3. <u>Integration of all elements of the Board's regulatory policy is essential</u>.

   Any modification of historic reciprocal switching policy that is implemented should be carefully integrated with other elements of the Board's regulatory policy. The rail industry in general and shippers in particular will not be well served by a piecemeal approach that focuses exclusively on expanded forced access.

III. Differential Pricing is Important in Industries with Large Fixed and Common Costs.

The rail industry is characterized by substantial fixed and common costs of production. Fixed costs are costs that do not vary with the scale of operation. Common costs are costs that are not caused solely by the provision of a single service. Rail carriers incur large infrastructure costs that do not vary with the number, size, or type of shipments that traverse the infrastructure.

In the presence of large fixed and common costs, a supplier must secure from some or all customers revenue that substantially exceeds relevant variable costs.[1] Otherwise, the supplier will incur a financial loss, and so will be unable to continue to deliver valued services to customers.[2] Furthermore, given the long-lived nature of rail infrastructure, it can be important for rail carrier revenue to exceed variable production costs for extended periods of time.

Differential, demand-based pricing is employed in the rail industry to help rail carriers secure revenues that recover both variable costs and fixed costs. While precluding prices above relevant stand-alone costs of production, prevailing regulatory policy allows rail carriers to respond to market forces and shipper demand characteristics when setting transport prices. The prevailing policy thereby enables rail carriers to efficiently expand the use of their infrastructure while recovering all of their production costs. Differential pricing facilitates this desirable outcome by implementing relatively low prices for shippers with demands for rail transport that are relatively sensitive to price. High prices could induce such shippers to dramatically reduce or completely curtail their use of rail transport, and thereby reduce or eliminate their contributions to fixed costs.[3]

In essence, the differential pricing permitted by prevailing regulatory policy promotes the collection of revenues sufficient to cover both variable and fixed costs of production while limiting the losses that arise when shippers reduce their demand for rail transport as prices increase above relevant variable costs. Differential, demand-based pricing is a central feature of

---

[1] Variable costs are costs that vary with the level of output produced.

[2] To remain financially viable, a supplier must secure revenue that is at least as great as the sum of its fixed and variable costs. When fixed costs are large, revenue that is only modestly above variable cost will not cover the sum of fixed and variable costs. Revenue that substantially exceeds variable costs is necessary in this case.

[3] See Gallamore and Meyer (2014, chapter 9) and Mayo and Sappington (2016), for example. Baumol and Sidak (1994b, p. 102) observe that "it is normal and not anticompetitive for a firm to price some or all of its products to provide … some contribution toward recovery of common fixed costs [ ]. The appropriate and viable size of the contribution of a particular product depends in part upon demand conditions for that product; it does not follow any standard markup rule or any arbitrary cost-allocation procedure."

Ramsey prices, which are widely viewed by economists as the "gold standard" for prices in regulated industries.[4]

IV. The Need for a Revised Reciprocal Switching Policy is Not Apparent.

The Staggers Rail Act of 1980 included a reciprocal switching provision.[5] Previously, the Board only considered forced access upon a showing that the incumbent carrier had engaged in anticompetitive conduct. In a departure from historic practice, the Board's proposes here to force access even when an absence of reciprocal switching does not reflect any anticompetitive behavior by the incumbent. The problem that the Board seeks to solve with this modified policy is not apparent, but the Board cites as one rationale for its modified policy the fact that "shippers have not filed petitions for reciprocal switching in many years" (STB Decision, pp. 8-9).

The absence of shipper petitions for forced access does not imply that the Board's historic policy has failed to protect shippers and promote efficient reciprocal switching. The absence of such petitions may indicate instead that rail carriers have voluntarily negotiated reciprocal switching agreements over time as the carriers identified settings where such agreements produced cost savings. Voluntary agreements of this sort should be expected because rail carriers have a natural incentive to undertake reciprocal switching whenever it reduces industry transport costs.

To explain this natural incentive, consider Figure 1, which depicts a simple setting where a shipper wishes to transport goods from origin O to destination D. Only railroad 1 ("RR1") can supply transport between O and the interchange point I. RR1 and railroad 2 ("RR2") can both supply transport between I and D. RR1 incurs variable cost c_1 when it supplies transport between O and I, and variable cost C_1 when it supplies transport between I and D. Therefore, RR1's

---

[4] Ramsey (1927) studies the closely related problem of how to raise a specified amount of revenue from indirect taxes while minimizing the harm imposed on taxpayers. He notes (on page 47) that "the obvious solution that there should be no differentiation [in tax rates] is entirely erroneous." Baumol and Bradford (1970) demonstrate how Ramsey principles inform the prices that maximize consumer welfare while ensuring a specified level of earnings for a multiproduct monopolist. Prices that reflect marginal production costs are ideal (or "first-best") in the sense that they induce welfare-maximizing levels of consumption. However, such prices generally will force a monopolist to incur a financial loss when the firm's average cost of production declines as the scale of its operation increases. Ramsey pricing has been described as the "socially most efficient second-best solution [to the] classical problem of regulating a natural monopoly" (Bonbright et al., 1988, p. 434).

[5] The Act states that "The Board may require rail carriers to enter into reciprocal switching agreements, *where it finds such agreements to be practicable and in the public interest, or where such agreements are necessary to provide competitive rail service*." Pub. L. 96-448, 94 Stat. 1895. Reciprocal switching occurs when "an incumbent carrier transports a shipper's traffic to an interchange point, where it switches the cars over to the competing carrier" (STB Decision, p. 2).

variable cost of supplying transport between O and D is $c_1 + C_1$. RR2 incurs variable cost C_2 when it supplies transport between I and D.[6]

We assume for this illustration that the shipper views the transport between I and D provided by the two rail carriers to be equivalent, and has no strict preference for having its goods transported from O to D by a single rail carrier. Therefore, in the presence of reciprocal switching, the shipper will choose to secure OD transport (i.e., the transport of its goods from O to D) from the rail carrier that offers to supply the transport for the lowest price.

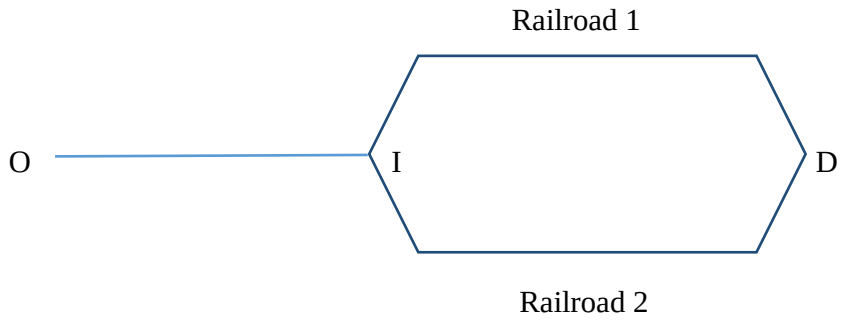


Figure 1. A Component of a Rail Network.[7]

In this simple setting (and more generally), RR1 has a natural incentive to arrange for reciprocal switching with RR2 whenever such switching will reduce the cost of transporting the shipper's goods between O and D.[8] Specifically, whenever $C_2 < C_1$ (so RR2's cost of transporting the shipper's goods from I to D is less than RR1's corresponding costs), RR1 and RR2 can both increase their earnings via a reciprocal switching agreement without raising the price charged to the shipper. The rail carriers can divide the cost savings that arise from reciprocal switching $(C_1 - C_2)$ to ensure that both carriers secure higher earnings than they would secure in the absence of reciprocal switching.[9]

---

[6] These costs can be viewed as per-unit costs. For expositional ease, we abstract from any costs that RR1 might incur in transferring traffic to RR2. (Any corresponding costs that RR2 incurs are included in C_2.) In practice, forced access can impose substantial costs on incumbent rail carriers. These costs include relevant scheduling, coordination, congestion, and delay costs.

[7] Figure 1 is drawn from Baumol and Sidak (1994).

[8] As noted above, these costs include physical transport costs as well as relevant network scheduling, coordination, congestion, and delay costs.

[9] To document formally the mutual gains that voluntary reciprocal switching can generate, let p_1 denote the price that RR1 charges the shipper to transport his goods from O to D. In the absence of reciprocal switching, RR1's earnings from this transaction would be $p_1 - c_1 - C_1$ and RR2's corresponding earnings would be 0. Let Δ denote a payment that RR1 delivers to RR2 for transporting the shipper's goods from I to D. Suppose this payment exceeds C_2 but is less than C_1 (so $C_2 < \Delta < C_1$). Then under

The lower costs that RR1 effectively secures via reciprocal switching also can encourage the rail carrier to reduce the price it charges the shipper to transport his goods from O to D. An industry supplier (even a monopoly supplier) typically will reduce the price it charges for its service as its costs decline.[10] Therefore, even in the absence of any reciprocal switching mandate, rail carriers have a natural incentive to undertake reciprocal switching whenever such switching will reduce relevant physical transport costs without introducing undue operating concerns or network complications. The switching can generate gains for all parties, including shippers.

These observations imply that the absence of shipper petitions for reciprocal switching may reflect the fact that rail carriers are employing such switching when it can benefit shippers by reducing relevant transport costs. More generally, the absence of formal requests for regulatory intervention does not imply that the request process is unduly onerous. Rather, an absence of requests can reflect an absence of behavior that warrants modification.

The Board observes that "shippers have not filed petitions for reciprocal switching in many years, despite expressing concerns about competition" (STB Decision, p. 8). It is natural for profit-maximizing entities to be concerned with their operating expenses and their earnings and to pursue actions designed to reduce expenses and increase earnings. In regulated industries, these actions often include soliciting favorable treatment from regulators.[11] Such self-interested activity is understandable and common. However, the presence of such activity does not imply that the prevailing regulatory policy fails to serve the public interest. As we explain in the next section, the public interest is well served in the rail industry by differential, demand-based pricing that ensures the recovery of fixed and common costs.

---

reciprocal switching, RR1's earnings are $p_1 - c_1 - \Delta > p_1 - c_1 - C_1$, and RR2's earnings are $\Delta - C_2 > 0$. Therefore, reciprocal switching increases the earnings of both railroads without changing the price charged to the shipper.

[10] A price reduction increases the number of units that a supplier sells, which can increase the supplier's revenue. A profit-maximizing supplier will reduce the price it charges for its product as long as the increased revenue it secures from the price reduction exceeds the increase in cost required to serve the increased demand. As the supplier's incremental cost of serving increased demand declines, the supplier will find it profitable to reduce price further, even though the additional price reduction generates a smaller increase in revenue. These considerations apply when the supplier is not restrained by price regulation.

[11] In the U.S. postal industry, for instance, different groups of mail users (e.g., those who primarily send (first class) letters vs. those who primarily send (second class) magazines or (third class) bulk advertisements) regularly attempt to convince the Postal Rate Commission that they should be charged less for the services they secure from the U.S. Postal Service. Similarly, different groups of electricity customers (e.g., residential vs. commercial customers or customers who install solar panels on their rooftops vs. those who do not install these panels) routinely argue for more favorable treatment from state electricity regulators.

V. The Board's Modified Policy Does Not Ensure that the Public Interest is Served.

As noted in Section IV, the Board has decided to mandate reciprocal switching either where such switching is "practicable and in the public interest" or where it is "necessary to provide competitive rail service" (STB Decision, p. 1). Because this policy does not require that reciprocal shipping be shown to promote the public interest before it is mandated, the policy may fail to serve the public interest. Even when reciprocal switching is needed to endow a particular shipper with competitive rail service, the resulting gain for the individual shipper can be more than offset by the associated losses imposed on all shippers in the aggregate. In this event, forced access will fail to serve the public interest even though it increases competitive alternatives to selected individual shippers.

Any benefit that forced access might generate for selected shippers should be evaluated in the context of the impact of the access on the aggregate welfare of all shippers combined. As noted above, the rail industry is characterized by substantial fixed and common costs of production. The revenues that a rail carrier secures from all shippers combined must cover all of the carrier's fixed and variable costs if it is to remain financially solvent. The Board has wisely implemented a comprehensive differential, demand-based pricing policy for rail transport services that is designed in part to enable efficient rail carriers to secure revenues that cover both variable and fixed costs. Such a policy thereby enables the carriers to undertake the investments that are required to provide ongoing high-quality transport services to all shippers. A forced access policy that undermines the Board's comprehensive differential pricing policy can reduce the aggregate welfare of all shippers combined, and thereby fail to serve the public interest.

A forced access policy can have this undesirable effect by enabling shippers located near rail exchanges to reduce the contributions they make to covering fixed and common costs. Unless these reduced contributions are offset by increased contributions from other shippers, rail carriers may be unable to secure the revenue they require for continued investment in essential infrastructure. In this event, all shippers will suffer as rail service unavoidably deteriorates. Consequently, forced access that benefits individual shippers located near railroad interchanges can reduce the aggregate welfare of all shippers combined, and thereby harm the public interest.

To ensure that a forced access policy does not jeopardize a rail carrier's financial health and thus its ongoing ability to provide high-quality transport services to shippers, the rules that govern compensation for forced access must be designed carefully. The appropriate design of such rules is discussed next.

VI. To Protect the Public Interest, Access Charges Must Reflect Sound Economic Principles.

To develop the basic economic principles that underlie the design of appropriate compensation for forced access, it is convenient to return to the simple setting of Figure 1 and introduce two additional pieces of notation. First, let p_1 denote the price that RR1 charges for OD transport in this setting in the absence of forced access. This price might reflect the regulated price ceiling for OD transport or the maximum price the shipper is willing to pay for this service, for instance. In either case, p_1 constitutes an upper bound on the price that can be charged for OD transport, regardless of whether reciprocal switching is mandated.

Second, let A denote the *access charge* that prevails under forced access in this setting. In other words, A is the payment that RR2 must make to RR1 for supplying access to RR2, i.e., for transporting the shipper's goods from O to I and then handing the shipment off to RR2 at I.

We will now demonstrate how the access charge, A, can be set to ensure that industry transportation costs are minimized while maintaining the contributions to fixed and common costs that have been determined by a combination of market forces and regulatory oversight.

A. Forced Access, like Voluntary Reciprocal Switching, Promotes Industry Cost Minimization, but Low Access Charges Can Jeopardize a Carrier's Ability to Finance Essential Industry Investment.

We begin by demonstrating that the least-cost supplier of ID transport will secure the shipper's patronage under forced access in this setting as long as the access charge is not too high (formally, as long as $A \leq p_1 - C_1$).[12] Industry cost minimization will arise in this setting because, in essence, RR1 and RR2 compete on a level playing field even though the access charge may differ from RR1's cost of supplying the associated transport service. This is the case because RR1 acts as if it faces the same access charge, A, that RR2 faces. Specifically, under forced access in this setting, RR1 will behave as if its cost of supplying OD transport is $A + C_1$, not $c_1 + C_1$.

To see why this is the case, observe that if RR2 sets price p_2 for OD transport, then RR1 can secure variable profit of (almost) $p_2 - c_1 - C_1$ if it sets a price for OD transport that is just below p_2, and thereby secures the shipper's patronage.[13] If RR1 does not offer a price below p_2 for OD transport, then it will obtain variable profit $A - c_1$ by supplying access to RR2. Therefore, RR1 will prefer to set a price just below p_2 whenever doing so enables it to increase its earnings, i.e., whenever:

---

[12] As we demonstrate below, forced access can fail to induce industry cost minimization if $A > p_1 - C_1$.

[13] Variable profit is the difference between revenue and variable cost. Variable profit does not account for relevant fixed costs of production.

$$p_2 - c_1 - C_1 > A - c_1 \quad \Leftrightarrow \quad A + C_1 < p_2 . \tag{1}$$

Equation (1) implies that RR1 acts as if its variable cost of providing OD transport is $A + C_1$ rather than $c_1 + C_1$. This conclusion reflects the fact that when it secures the shipper's patronage, RR1 foregoes the access charge (A) it would have received if RR2 had secured the shipper's patronage. Therefore, A effectively constitutes a cost (an opportunity cost) that RR1 incurs when it serves the shipper.

Under forced access, RR2 can profitably reduce the price it charges for OD transport as low as its cost of providing the service, which is $A + C_2$. Therefore, competition between RR1 and RR2 will drive the price for OD transport to a level that is just below the larger of the two firms' effective costs of supply, $A + C_1$ and $A + C_2$. When RR1 is the least-cost supplier of ID transport (so $C_1 < C_2$), RR1 will have a lower effective cost than RR2. Consequently, RR1 will serve the shipper, charging a price just below $A + C_2$ (or price p_1 if this maximum feasible price is less than $A + C_2$). When RR2 is the least-cost supplier of ID transport (so $C_2 < C_1$), RR2 will have a lower effective cost than RR1. Consequently, RR2 will serve the shipper, charging a price just below $A + C_1$.[14]

These observations imply that as long as the access charge does not exceed $p_1 - C_1$, competition between the rail carriers will ensure that the least-cost supplier of ID transport secures the shipper's patronage. As the access charge declines, the price that the shipper pays for transport declines and the corresponding contribution to RR1's fixed and common costs declines, thereby potentially jeopardizing the carrier's ability to finance essential industry investment (as explained above and discussed further below). However, the least-cost supplier of ID transport will secure the shipper's patronage for any access charge below $p_1 - C_1$.[15]

B. ECPR Access Charges Preserve Contributions to Fixed Costs.

Even though forced access can ensure industry cost minimization, it can erode the contributions to fixed and common costs that are embodied in the prices that have been

[14] Observe that $A + C_1$ does not exceed the price ceiling, p_1, because $A \leq p_1 - C_1$, by assumption.

[15] If $A > p_1 - C_1$, then RR2 may not supply ID transport even when it is the least-cost supplier of the transport (so $C_2 < C_1$). To understand this conclusion, observe that if $A > p_1 - C_1$, then $p_1 < A + C_1$. Consequently, the prevailing price ceiling for OD transport (p_1) is less than RR1's effective cost of supplying OD transport. Therefore, RR2 cannot secure the shipper's patronage simply by offering to supply OD transport for a price that is just below RR1's effective cost of supplying the transport. RR2 must reduce the price of OD transport to p_1. RR2 may find it unprofitable to set this relatively low price unless its cost of supplying ID transport is substantially less than RR1's corresponding cost. Specifically, RR2 will only find it profitable to supply OD transport at price p_1 if $A + C_2 < p_1 \Leftrightarrow C_2 < p_1 - A \Leftrightarrow C_2 < C_1 - (A + C_1 - p_1)$. Thus, if RR2 is to find it profitable to supply OD transport at price p_1, RR2's variable cost of supplying ID transport must be less than RR1's corresponding cost by at least $A + C_1 - p_1 > 0$.

established by the Board's regulatory policies. The prices that rail carriers presently charge to shippers, like the associated contributions to fixed and common costs, respect all of the regulatory rules that the Board has imposed. These rules have been designed in part to enable rail carriers to secure the revenue they require to finance essential industry investment. Preserving the prevailing contributions will continue to serve this vital function, and thereby help to ensure that shippers are well-served.

To determine how access prices should be set in a forced access regime to preserve contributions to fixed and common costs, continue to consider the setting illustrated in Figure 1. Recall from Section VI.A that in the presence of competition between RR1 and RR2, the shipper will select RR2 to ensure OD transport and will pay a price (just below) $A + C_1$ for this service if RR2 is the least-cost supplier of ID transport.[16] RR1 will only provide OI transport in this case, and will secure variable profit $A - c_1$ in doing so. The variable profit that RR1 secures can be viewed as contribution to cover the rail carrier's fixed and common costs of production.

RR1's variable profit in the absence of mandated switching (where RR1 is the only rail carrier that can offer to supply OD transport to the shipper) is $p_1 - c_1 - C_1$. Therefore, the access charge that is imposed under forced access will preserve the contribution to RR1's fixed and common costs of production if and only if:

$$p_1 - c_1 - C_1 \;=\; A - c_1 \quad \Leftrightarrow \quad A \;=\; p_1 - C_1 \,. \tag{2}$$

The access charge in equation (2) reflects the *efficient component pricing rule* (ECPR).[17] An ECPR access charge, which reflects the difference between the prevailing price of OD transport and RR1's variable cost of supplying ID transport, ensures that forced access does not alter the contribution that RR1 receives to cover its fixed production costs when RR2 is the least-cost supplier of ID transport and so secures the shipper's patronage.

To understand why this is the case, observe from equation (2) that the ECPR access charge can be rewritten as:

$$A \;=\; p_1 - C_1 \;=\; c_1 + (p_1 - \; c_1 - C_1) \,. \tag{3}$$

Equation (3) implies that the ECPR access charge can be viewed as the sum of RR1's variable cost of providing OI transport and the profit it foregoes when the shipper decides to contract with RR2, rather than RR1, for OD transport. Thus, the ECPR access charge is the sum of RR1's

[16] We assume throughout the ensuing discussion in this section that $A \leq p_1 - C_1$.

[17] See, for example, Willig (1979), Baumol (1983), Baumol and Sidak (1994a,b), Armstrong et al. (1996), Armstrong (2002), and Armstrong and Sappington (2007).

variable cost of providing the bottleneck service (OI transport) and the opportunity cost that RR1 incurs when it supplies access to RR2, thereby allowing RR2 to serve the shipper's needs.[18]

In summary, we have demonstrated that among all access charges that ensure industry cost minimization (i.e., among all $A \leq p_1 - C_1$), the ECPR access charge is the only one that preserves the contributions to a carrier's fixed production costs – contributions that have been determined by rail transport prices that respect all of the Board's regulatory policies.

C. Cost-Based Access Charges Can Reduce Contributions to Fixed Costs and Limit Efficient Investment and Cooperation.

In contrast to an ECPR access charge, a cost-based access charge only reflects a rail carrier's physical cost of supplying access, and does not include any relevant opportunity cost. For the reasons identified in Section VI.B, a cost-based access charge may fail to preserve contributions to a carrier's fixed and common costs. The price the shipper is charged for OD transport will depend on the magnitude of the cost-based access charge. If the charge is less than the ECPR access charge, then a rail carrier's variable profit, and hence the contribution it receives to cover its fixed costs, will decline.

To illustrate this more general conclusion, return to the setting of Figure 1 and consider a cost-based access charge that reflects RR1's cost of supplying OI transport (so $A = c_1$). Suppose this access charge is implemented in a setting where RR1 and RR2 are equally efficient at supplying ID transport (so $C_1 = C_2$). Further suppose that before forced access was imposed in this setting, the price that RR1 charged for OD transport (p_1) provided a positive contribution to its fixed costs (so $p_1 > c_1 + C_1$). Competition between RR1 and RR2 under forced access in this setting will drive the price of OD transport to $c_1 + C_1 < p_1$.[19] Therefore, even if RR1 continues to supply OD transport, it will do so at a price that delivers reduced contribution to its fixed costs.

When the competition induced by forced access reduces the contribution to a rail carrier's fixed costs, the carrier's ability to undertake the investment required to deliver high-quality service to shippers on an ongoing basis can be jeopardized. ECPR access charges avoid a decline in a rail carrier's financial health, and thereby increase the likelihood that the carrier will be able to undertake efficient investments that benefit shippers.

---

[18] In settings where RR1 incurs costs that exceed c_1 when it provides OI transport and then transfers the traffic to RR2, the ECPR access charge will be increased to reflect these higher costs.

[19] Recall from the discussion in Section VI.A that competition between RR1 and RR2 will drive the price charged for OD transport to the smaller of $A + C_1$ and $A + C_2$, which is $c_1 + C_1 = c_1 + C_2$ in the present setting.

ECPR access charges also help to ensure that rail carriers are motivated to facilitate the efficient exchange of traffic at railroad interchanges. Because ECPR access charges do not impose financial losses on an incumbent rail carrier when it transfers traffic to a competing carrier, the incumbent carrier will not be averse to such transfers. In contrast, access charges that are set below the ECPR level can reduce incentives to promote efficient traffic exchange. When an exchange of traffic will reduce a rail carrier's earnings, the carrier will not be naturally inclined to facilitate the exchange.

VII. Any Forced Access Policy Should be Carefully Integrated with Other Elements of Prevailing Regulatory Policy.

The foregoing discussion explains why ECPR access charges can both ensure industry cost minimization and prevent the erosion of contribution to rail carriers' fixed and common costs of production. The latter benefit of ECPR access charges is particularly important because it promotes ongoing efficient investment in the rail industry that facilitates the supply of high-quality services to shippers. It is also important to emphasize that ECPR access charges only allow rail carriers to recover the contributions to fixed and common costs that have been determined by a combination of market forces and regulatory oversight. ECPR access charges do not promote enhanced overall carrier earnings.

If the Board is nonetheless disinclined to adopt ECPR charges, then it will be important for the Board to explain clearly how the access charge policy it adopts is carefully integrated with other key components of prevailing regulatory policy. It will be particularly important to explain how each rail carrier's ability to engage in differential, demand-based pricing and recover the fixed and common costs of its network will be protected. As noted above, this ability is essential to earning adequate returns in an industry with large fixed and common costs.

Congress has deemed that "The Board shall make an adequate and continuing effort to assist those carriers in attaining" revenue adequacy. 49 U.S.C. § 10704. ECPR access charges would be consistent with the Board's mandate to assist rail carriers in their quest to achieve revenue adequacy. In contrast, cost-based access charges, which do not preserve contributions to fixed and common costs, generally would be inconsistent with this mandate.

If the Board's intent is to employ forced access to suppress railroad earnings, then the Board would be well-advised to take full account of the widely-documented drawbacks to strict earning regulations.[20] These drawbacks include diminished incentive to implement proven

[20] We offer no views on whether the agency has the authority to employ expanded mandated reciprocal switching as an alternative means to regulate the prices charged to shippers.

methodologies for reducing costs, to discover new methodologies for securing cost reductions, to enhance the quality of existing services, and to develop innovative new services.[21]

Moreover, the best way to limit earnings generally will not entail exclusive reliance on forced access policies. Such policies typically will not deliver the maximum possible aggregate benefits for all shippers while providing rail carriers with a reasonable opportunity to secure appropriate levels of earnings.[22] The best policy in this regard will instead reflect Ramsey principles, ensuring that the prices charged to shippers will be set relatively far above relevant production costs when shipper demand is relatively insensitive to price.

If access charges fail to preserve contributions to fixed and common costs, then reliance on forced access to reduce railroad earnings will tend to induce the largest price reductions on services supplied to shippers located near railroad interchanges. It seems unlikely that these shippers are systematically more responsive to rail transport prices than are other shippers. Consequently, employing forced access to reduce earnings is unlikely to induce shipping rates that reflect Ramsey pricing principles.

It should also be noted that even when access charges and prices charged to shippers are explicitly designed to suppress the earnings of rail carriers, the optimal policy typically will implement access charges that exceed the relevant physical costs of providing access. Such a policy will ensure that rail carriers secure contributions to fixed and common costs from all of the services they supply, including transport services supplied to shippers and access services supplied to competing rail carriers. Access charges that exceed access costs (and potentially even exceed ECPR access charges) can benefit shippers by permitting corresponding reductions in the prices that they pay for transport.[23]

---

[21] Sources that discuss these (and other) drawbacks to stringent earning regulation include Posner (1969), Baumol and Klevorick (1970), Beesley and Littlechild (1989), Braeutigam and Panzar (1989), Brennan (1989), Armstrong et al. (1994, p. 13), Kaserman and Mayo (1995, p. 478), Sappington and Weisman (1996, p. 5), Newbery (1999, p. 38), Weisman and Pfeifenberger (2003), Armstrong and Sappington (2007), and Mayo and Sappington (2016).

[22] Baumol and Sidak (1994b, p. 108) observe that "regulatory rules … will do their full job only if they are all carried out together. Partial adoption or enforcement of the rules will not achieve all the desired results."

[23] Armstrong et al. (1996, pp. 135-6) observe that "when prices for all services are chosen optimally together, … the optimal access charge exceeds the ECPR prescription … [because] high access charges enable the retail price to be reduced while maintaining budget balance." Similarly, Armstrong (2002, section 2.5.1) observes that "a higher [access charge] raises more revenue that can be used partly to cover the fixed costs, and this allows [the retail price] to be lowered (which is good for welfare)."

VIII. Conclusion.

We have explained why forced access will fail to serve the public interest if access charges do not preserve contributions to fixed and common costs of production. We have also explained why, in contrast to cost-based access charges, ECPR access charges can ensure industry cost minimization while consistently precluding the erosion of contributions to fixed and common costs. By preventing such erosion, ECPR access charges can help to ensure that rail carriers are able to finance the ongoing infrastructure investment that is required to deliver high-quality transport services to shippers.

We have also emphasized the importance of integrating a forced access policy with other elements of the Board's regulatory policy. The rules that govern access charges and prices charged to shippers should be designed in integrated fashion to maximize the aggregate welfare of all shippers combined while ensuring revenue adequacy for efficient rail carriers. The optimal such rules will reflect Ramsey principles and entail the differentiated, demand-based pricing that appropriately plays a central role in current pricing policies in the U.S. rail industry.

VERIFICATION

I, Christopher Mark Armstrong, declare under penalty of perjury that my Verified Statement is true and correct to the best of my knowledge, belief, and information. Further, I certify that I am qualified and authorized to file this statement.

Christopher Mark Armstrong

Executed on this 26 day of October 2016.

VERIFICATION

I, David Sappington, declare under penalty of perjury that my Verified Statement is true and correct to the best of my knowledge, belief, and information. Further, I certify that I am qualified and authorized to file this statement.

David Sappington

Executed on this 20th day of October 2016.

Attachment A: References

Armstrong, Mark, "The Theory of Access Pricing and Interconnection," in Martin Cave, Sumit Majumdar, and Ingo Vogelsang (eds.), *Handbook of Telecommunications Economics*. Amsterdam: North-Holland Publishers, 2002, Chapter 8.

Armstrong, Mark, Simon Cowan, and John Vickers, *Regulatory Reform: Economic Analysis and British Experience*. Cambridge, MA: MIT Press, 1994.

Armstrong, Mark, Chris Doyle, and John Vickers, "The Access Pricing Problem: A Synthesis," *Journal of Industrial Economics*, 44(2), June 1996, 131-150.

Armstrong, Mark and David E. M. Sappington, "Recent Developments in the Theory of Regulation," in *The Handbook of Industrial Organization, Volume 3*, edited by Mark Armstrong and Robert Porter. Elsevier Science Publishers, 2007, pp. 1557-1700.

Baumol, William J., "Some Subtle Issues in Railroad Regulation," *International Journal of Transport Economics*, 10, August 1983, 341-355.

Baumol, William J. and David Bradford, "Optimal Departures from Marginal Cost Pricing," *American Economic Review*, 60(3), June 1970, 265-283.

Baumol, William J. and Alvin K. Klevorick, "Input Choices and Rate-of-Return Regulation: An Overview of the Discussion," *Bell Journal of Economics and Management Science*, 1(2), Autumn 1970, 162-190.

Baumol, William J. and J. Gregory Sidak, "The Pricing of Inputs Sold to Competitors," *Yale Journal on Regulation*, 11(1), Winter 1994a, 171-202.

Baumol, William J. and J. Gregory Sidak, *Toward Competition in Local Telephony*. Cambridge, MA: MIT Press, 1994b.

Beesley, Michael E. and Stephen C. Littlechild, "The Regulation of Privatized Monopolies in the United Kingdom," *Rand Journal of Economics*, 20(3), Autumn 1989, 454-472.

Bonbright, James C., Albert L. Danielsen, and David R. Kamerschen, *Principles of Public Utility Rates* (Second Edition). Arlington, VA: Public Utilities Reports, Inc., 1988.

Braeutigam, Ronald R. and John C. Panzar, "Diversification Incentives under 'Price-Based' and 'Cost-Based' Regulation," *Rand Journal of Economics*, 20(3), Autumn 1989, 373-91.

Brennan, Timothy, "Regulating by Capping Prices," *Journal of Regulatory Economics*, 1(2), June 1989, 133-148.

Gallamore, Robert E. and John R. Meyer, *American Railroads: Decline and Renaissance in the Twentieth Century*. Cambridge, MA: Harvard University Press, 2014.

Kaserman, David L. and John W. Mayo, *Government and Business. The Economics of Antitrust and Regulation*. Fort Worth, TX: The Dryden Press, 1995.

Mayo, John W. and David E. M. Sappington, "Regulation in a 'Deregulated' Industry: Railroads in the Post-Staggers Era," *Review of Industrial Organization*, 49(2), September 2016, 203-227.

Newbery, David M., *Privatization, Restructuring, and Regulation of Network Utilities*. Cambridge, MA: The MIT Press, 1999.

Posner, Richard A., "Natural Monopoly and Its Regulation," *Stanford Law Review*, 21(3), February 1969, 548-643.

Ramsey, F. P., "A Contribution to the Theory of Taxation," *Economic Journal*, 37(145), March 1927, 47-61.

Sappington, David E. M. and Dennis L. Weisman, *Designing Incentive Regulation for the Telecommunications Industry*. Cambridge, MA: The MIT Press, 1996.

Weisman, Dennis L. and Johannes Pfeifenberger, "Efficiency as a Discovery Process: Why Enhanced Incentives Outperform Regulatory Mandates," *The Electricity Journal*, 16(1), January/February 2003, 55-62.

Willig, Robert D., "The Theory of Network Access Pricing," in Harry M. Trebing (ed.), *Issues in Public Utility Regulation*. Lansing, MI: Michigan State University Public Utilities Papers, 1979.

Attachment B: Curriculum Vitae of Professors Armstrong and Sappington

2016

Name: Christopher Mark Armstrong

Address: Department of Economics
University Of Oxford
Manor Road
Oxford OX1 3UQ
UK

Or

All Souls College
Oxford OX1 4AL
UK

Telephone: +44 (0) 1865 281298
E-mail: mark.armstrong@economics.ox.ac.uk

Date of birth: 26 December 1964

Citizenship: UK/Canadian

Position: Professor of Economics and Fellow of All Souls College, University of Oxford (since September 2011)

Editorial activities: *Rand Journal of Economics*: associate editor (1995-2002), co-editor (2005-)
Review of Economic Studies: board member (1993-2011), assistant editor (1997-99), managing editor (1999-2003), chair (2003-2010)
Journal of Industrial Economics: board member (1995-2005)

Other activities: Fellow of the *British Academy* (2007)
Fellow of the *Econometric Society* (2008)
Fellow of the *European Economic Association*
Council member of *European Economic Association* (2010-2015)
Council member and member of Executive Committee of *Royal Economic Society* (2010-2015)
Council member, *Econometric Society* (2016-2019)

Education:

1984-1987: Queens' College, Cambridge, B.A. in Mathematics (First Class)

1987-1992: St. John's College, Oxford, M.Phil. and D.Phil. in Economics
Supervisor: James Mirrlees

Previous employment:

1990-1992: Institute of Economics and Statistics, Oxford
Research Officer on ESRC project *The Regulation of Firms with Market Power*

1992-1994: University Assistant Lecturer in Microeconomics
University of Cambridge
Fellow of Gonville and Caius College, Cambridge

1994-1997: Eric Roll Professor of Economic Policy
Department of Economics, University of Southampton

1997-2003: Official Fellow in Economics
Nuffield College, University of Oxford

2003-2011: Professor of Economics
University College London

Published articles and major book chapters:

"Welfare Effects of Price Discrimination by a Regulated Monopolist", (1991), *Rand Journal of Economics* 22: 571-580 (with John Vickers).

"Price Discrimination, Competition and Regulation", (1993), *Journal of Industrial Economics* 41: 335-359 (with John Vickers). [Reprinted in *The Economics of Price Discrimination*, edited by G. Norman, Edward Elgar, (1999).]

"Nonlinear Pricing and Price Cap Regulation", (1995), *Journal of Public Economics* 58: 33-55 (with Simon Cowan and John Vickers).

"Multiproduct Nonlinear Pricing", (1996), *Econometrica* 64: 51-76.

"The Access Pricing Problem: A Synthesis", (1996), *Journal of Industrial Economics* 44: 131-150 (with Chris Doyle and John Vickers). [Reprinted in *Economic Regulation*, edited by P. Joskow, Edward Elgar, (2000) and *Developments in the Economics of Privatization and Regulation*, edited by M. Crew and D. Parker, Edward Elgar (2008).]

"Optimal Regulatory Lag Under Price Cap Regulation", (1996), *Revista Espanola de Economia* 2: 93-116 (with Ray Rees and John Vickers).

"Regulatory Reform in Telecommunications in Central and Eastern Europe", (1996), Economies *in Transition* 4: 295-318 (with John Vickers).

"Competition in Telecommunications", (1997), *Oxford Review of Economic Policy* 13: 64-82. [Reprinted as "Telecommunications" in *Competition in Regulated Industries*, edited by D. Helm and T. Jenkinson, Oxford University Press (1998).]

"The Access Pricing Problem with Deregulation: A Note", (1998), *Journal of Industrial Economics* 46:115-121 (with John Vickers).

"Network Interconnection in Telecommunications", (1998), *Economic Journal* 108: 545-564. [Winner of the Royal Economic Society Prize for best paper published in the *Economic Journal* this year.]

"Price Discrimination by a Many-Product Firm", (1999), *Review of Economic Studies* 66: 151-168.

"Optimal Regulation with Unknown Demand and Cost Functions", (1999), *Journal of Economic Theory* 84: 196-215.

"Multi-Dimensional Screening: A User's Guide", (1999), *European Economic Review* 43: 959-979 (with Jean-Charles Rochet).

"On the Distribution of the Maximum Likelihood Estimator", (1999), *Econometrica* 67: 1459-1470 (with Grant Hillier).

"Competition in the Pay-TV Market", (1999), *Journal of the Japanese and International Economies* 13: 257-280.

"Multiproduct Price Regulation Under Asymmetric Information", (2000), *Journal of Industrial Economics* 48: 137-160 (with John Vickers).

"Optimal Multi-Object Auctions", (2000), *Review of Economic Studies* 67: 455-481.

"Access Pricing, Bypass and Universal Service", (2001), *American Economic Review* 91 (Papers and Proceedings): 297-301.

"Competitive Price Discrimination", (2001), *Rand Journal of Economics* 32: 579-605 (with John Vickers).

"The Theory of Access Pricing and Interconnection", (2002), in *Handbook of Telecommunications Economics,* eds. M. Cave, S. Majumdar and I. Vogelsang, North-Holland.

"Toward a Synthesis of Models of Regulatory Policy Design with Limited Information", (2004), *Journal of Regulatory Economics* 26: 1-21 (with David Sappington).

"Network Interconnection with Asymmetric Networks and Heterogeneous Calling Patterns", (2004), *Information Economics and Policy* 16: 375-390.

"Public Service Broadcasting", (2005), *Fiscal Studies* 26: 281-299. [Text of my inaugural lecture at UCL.]

"Regulation, Competition, and Liberalization", (2006), *Journal of Economic Literature* 44: 325-366 (with David Sappington). [Reprinted in *Developments in the Economics of Privatization and Regulation*, edited by M. Crew and D. Parker, Edward Elgar (2008).]

"Recent Developments in the Economics of Price Discrimination", (2006), chapter 4 in *Advances in Economics and Econometrics: Theory and Applications, Ninth World Congress of the Econometric Society, Volume II,* Eds. Blundell, Newey, and Persson, Cambridge University Press.

"Competition in Two-sided Markets", (2006), *Rand Journal of Economics* 37: 668-691. [Winner of the 2007 Compass Prize for best paper published in an academic journal in 2006 about competition policy. Translated into Chinese and re-published in *Industrial Organization Review,* 2007, volume 1, 1-27.]

"Two-sided Markets, Competitive Bottlenecks and Exclusive Contracts", (2007), *Economic Theory* 32: 353-380 (with Julian Wright).

"Recent Developments in the Theory of Regulation", (2007), chapter 27 in *Handbook of Industrial Organization, Vol III,* Eds. M. Armstrong and R. Porter, North-Holland (with David Sappington).

"Interactions between Competition and Consumer Policy", (2008), *Competition Policy International* 4(1): 97-147.

"Access Pricing, Bypass and Universal Service in Post", (2008), *Review of Network Economics* 7(2): 172-187.

"Price Discrimination", (2008), in *Handbook of Antitrust Economics*, Ed P. Buccirossi, MIT Press.

"Consumer Protection and the Incentive to Become Informed", (2009), *Journal of the European Economic Association* (Papers and Proceedings) 7(2-3): 399-410 (with John Vickers and Jidong Zhou).

"Inattentive Consumers and Product Quality", (2009), *Journal of the European Economic Association* (Papers and Proceedings) 7(2-3): 411-422 (with Yongmin Chen).

"Prominence and Consumer Search", (2009), *RAND Journal of Economics* 40(2): 209-233 (with John Vickers and Jidong Zhou).

"Mobile Call Termination", (2009), *Economic Journal* 119 (538): F270-307 (with Julian Wright).

"Competitive Non-linear Pricing and Bundling", (2010), *Review of Economic Studies* 77: 30-60 (with John Vickers).

"A Model of Delegated Project Choice", (2010), *Econometrica* 78: 213-244 (with John Vickers).

"Collection Sales: Good or Bad for Journals?", (2010), *Economic Inquiry* 48: 163-176.

"Behavioral Economics as Applied to Firms: A Primer", (2010), *Competition Policy International* 6: 3-45 (with Steffen Huck).

"Paying for Prominence", (2011), *Economic Journal* 121: F368-F395 (with Jidong Zhou).

"Consumer Protection and Contingent Charges", (2012), *Journal of Economic Literature* 50:477-493 (with John Vickers).

"A More General Model of Commodity Bundling", (2013), *Journal of Economic Theory* 148: 448-472.

"Which Demand Systems Can be Generated by Discrete Choice", (2015), *Journal of Economic Theory* 158: 293-307 (with John Vickers).

"Search and Ripoff Externalities", (2015), *Review of Industrial Organization* 47: 273-302.

"Opening Access to Research", (2015), *Economic Journal* 125: F1-F30.

"Search Deterrence", (2016), *Review of Economic Studies* 83(1): 26-57 (with Jidong Zhou).

"Nonlinear Pricing", (2016), *Annual Review of Economics* 8: 583-614.

Books:
Regulatory Reform - Economic Analysis and UK Experience, (1994), MIT Press (with Simon Cowan and John Vickers).

Handbook of Industrial Organization, Vol. III, (2007), North-Holland (co-edited with Robert Porter).

Other Book Chapters:
"Competition and Regulation in Telecommunications", (1995), in *The Regulatory Challenge,* edited by M. Bishop, J. Kay and C. Mayer, Oxford University Press (with John Vickers).

"Social Obligations and Access Pricing: Telecommunications and Railways in the UK", (1998), in *Opening Networks to Competition,* edited by D. Gabel and D. Weiman, Kluwer Academic Press (with Chris Doyle).

"Local Competition in UK Telecommunications", (1998), in *Regulating Utilities: Understanding the Issues,* edited by M. Beesley, Institute of Economic Affairs.

"Anti-Competitive Agreements Between Firms in the Pay-TV Market", (2000), in *Third European Competition Law Annual 1998: Regulating Communications Markets,* eds. C.-D. Ehlermann and L. Gosling, Oxford, Hart Publishing.

"Regulation and Inefficient Entry", (2001), in *The Institutional Foundations of a Market Economy*, edited by G. Kochendorfer-Lucius and B. Pleskovic, The World Bank.

"Regulation and Inefficient Entry: Economic Analysis and the British Experience", (2001), in *The Anticompetitive Impact of Regulation*, edited by G. Amato and L. Laudauti, Edward Elgar Publishing.

"Converging Communications: Implications for Regulation", (2002), in *Utility Regulation and Competition Policy*, edited by C. Robinson, Edward Elgar Publishing.

"Two-Sided Markets: Economic Theory and Policy Implications", (2007), in *Recent Developments in AntiTrust: Theory and Evidence*, Ed. J.P. Choi, MIT Press.

"Public Service Broadcasting in the Digital World", (2007), in *The Economic Regulation of Broadcasting Markets: Evolving Technology and Challenges for Policy*, Ed. P. Seabright and J. von Hagen, Cambridge University Press (with Helen Weeds).

Major research funding:
Principal applicant (and Director) for ESRC Centre funding for *Centre for Economic Learning and Social Evolution* (ELSE), ESRC funding of £3.1 million for period 2005-2010.

Invited conference presentations and lectures:
1998: European Economic Association meeting, Berlin ("Multidimensional Screening: A User's Guide")

2000: American Economic Association meeting, New Orleans ("Access Pricing, Bypass and Universal Service")

2002: Econometric Society European meeting, Venice ("Competition in Two-Sided Markets")

2005: World Congress of Econometric Society, London ("Recent Developments in the Economics of Price Discrimination")

2006: Jornadas de Economía Industrial, Barcelona ("Nonlinear Pricing and Bundling")

2008: European Economic Association meeting, Milan ("Consumer Protection and the Incentive to Become Informed" and "Inattentive Consumers and Product Quality")

2008: Econometric Society Latin American meeting, Rio de Janeiro ("Consumer Protection and the Incentive to Become Informed")

2008: EARIE meeting, Toulouse ("Bundling")

2010: Royal Economic Society Annual Conference, Guildford ("Exploding Offers and Buy-Now Discounts")

2010: CRESSE meeting, Crete, J.-J. Laffont Lecture ("Behavioral Economics as Applied to Firms: A Primer")

2011: CEPR Conference on Applied I.O., Tel Aviv ("Exploding Offers and Buy-Now Discounts")

2012: NBER Summer Institute: Industrial Organization, Boston ("Discount Pricing")

2012: EARIE Conference, Rome ("Discount Pricing")

2013: Annual Meeting of the German Economic Association, Düsseldorf ("Search and Ripoff Externalities")

2014: Conference on *Industrial Organization: Theory, Empirics and Experiments*, Alberobello, Italy ("Search and Ripoff Externalities")

2015: Conference on *The Future of Scholarly Communication in Economics*, Hamburg ("Opening Access to Research")

2015: Jornadas de Economía Industrial, Alicante ("Search and Ripoff Externalities")

2016: Marshall Lecture, Annual Meeting of the European Economic Association, Geneva ("Ordered Consumer Search")

DAVID E. M. SAPPINGTON

Department of Economics, P.O. Box 117140
University of Florida, Gainesville, Florida 32611-7140
Telephone: (352) 392-3904 E-Mail: SAPPING@UFL.EDU

EDUCATION:

1980	Ph.D.	Economics, Princeton University.
1978	M.A.	Economics, Princeton University.
1976	B.A.	Economics, Haverford College.

PROFESSIONAL EXPERIENCE:

1991 – Present	Eminent Scholar, Department of Economics, University of Florida.
2001 – 2002	Chief Economist, Federal Communications Commission.
1989 – 1990	Matherly Professor of Economics, Department of Economics, University of Florida.
1989 – 1990	District Manager, Economics Research Group, Bell Communications Research.
1988 – 1989	Visiting Lecturer with Title of Full Professor, Department of Economics, Princeton University.
1984 – 1989	Member of Technical Staff, Economics Research Group, Bell Communications Research.
1982 – 1986	Assistant Professor, Department of Economics, University of Pennsylvania.
1980 – 1982	Assistant Professor, Department of Economics and Institute of Public Policy Studies, University of Michigan.

ADDITIONAL POSITIONS:

1999 – Present	Director, Robert F. Lanzillotti Public Policy Research Center, University of Florida.
1989 – Present	Senior Research Associate, Public Utility Research Center, University of Florida.
2009 – Present	Member of Board of Directors, Industrial Organization Society.
2008 – 2009	President, Industrial Organization Society.
2006 – 2007	Vice President, Industrial Organization Society.
1993 – 1998	Associate Director, Public Policy Research Center, University of Florida.

SERVICE ON EDITORIAL BOARDS:

1997 – Present	*The Rand Journal of Economics*	(Associate Editor)
1995 – Present	*The Journal of Regulatory Economics*	(Associate Editor)
1993 – Present	*Journal of Economics and Management Strategy*	(Co-Editor)
1992 – Present	*Information Economics and Policy*	(Board of Editors)
2009 – Present	*The Review of Industrial Organization*	(Board of Editors)
2009 – Present	*The Review of Network Economics*	(Board of Editors)
1983 – 2012	*Economics Letters*	(Advisory Editor)
2001 – 2006	*Journal of Public Policy and Marketing*	(Board of Editors)
1996 – 1999	*The American Economic Review*	(Board of Editors)
1991 – 1994	*The Journal of Industrial Economics*	(Associate Editor)
1991 – 1994	*The Journal of Regulatory Economics*	(Board of Editors)
1988 – 1992	*The American Economic Review*	(Board of Editors)

JOURNAL PUBLICATIONS:

"Strategic Firm Behavior Under a Dynamic Regulatory Adjustment Process," *The Bell Journal of Economics*, Vol. 11(1), Spring 1980, pp. 360-372.

"Precontractual Information Asymmetry Between Principal and Agent: The Continuous Case," *Economic Letters*, Vol. 5(4), November 1980, pp. 371-375.

"Optimal Regulation of Research and Development Under Imperfect Information," *The Bell Journal of Economics*, Vol. 13(2), Autumn 1982, pp. 354-368.

"Sustainability, Entry Restrictions, and Induced Technological Bias," *Quarterly Review of Economics and Business*, Vol. 22(4), Winter 1982, pp. 43-52 (with W. Shepherd).

"Limited Liability Contracts Between Principal and Agent," *Journal of Economic Theory*, Vol. 29(1), February 1983, pp. 1-21.

"Optimal Regulation of a Multiproduct Monopoly with Unknown Technological Capabilities," *The Bell Journal of Economics*, Vol. 14(2), Autumn 1983, pp. 453-463.

JOURNAL PUBLICATIONS (CONTINUED):

"Multi-Agent Control in Perfectly Correlated Environments," *Economics Letters*, Vol. 13(4), November 1983, pp. 325-330 (with J. Demski).

"Optimal Incentive Contracts with Multiple Agents," *Journal of Economic Theory*, Vol. 33(1), June 1984, pp. 152-171 (with J. Demski).

Reprinted in *Recent Developments in the Economic Theory of Incentives*, edited by D. Martimort. Cheltenham, UK: Edward Elgar Publishing, 2017.

"Incentive Contracting with Asymmetric and Imperfect Precontractual Knowledge," *Journal of Economic Theory*, Vol. 34(1), October 1984, pp. 52-70.

"To Brand or Not to Brand?: A Theoretical and Empirical Question," *The Journal of Business*, Vol. 58(3), July 1985, pp. 279-294 (with B. Wernerfelt).

"Line Item Reporting, Factor Acquisition, and Subcontracting," *The Journal of Accounting Research*, Vol. 24(2), Autumn 1986, pp. 250-269 (with J. Demski).

"On the Timing of Information Release," *Information Economics and Policy*, Vol. 2(4), December 1986, pp. 307-316 (with J. Demski).

"Commitment to Regulatory Bureaucracy," *Information Economics and Policy*, Vol. 2(4), December 1986, pp. 243-258.

"Managing Supplier Switching," *The Rand Journal of Economics*, Vol. 18(1), Spring 1987, pp. 77-97 (with J. Demski and P. Spiller).

"Information, Incentives and Organizational Mode," *The Quarterly Journal of Economics*, Vol. 102(2), May 1987, pp. 243-263 (with M. Riordan).

"Information and Regulation," in *Public Regulation: New Perspectives on Institutions and Policies*, E. Bailey (ed.), MIT Press, 1987, pp. 3-43 (with J. Stiglitz).

Reprinted in *Privatization in Developing Countries*, edited by P. Cook and C. Kirkpatrick. Cheltenham, UK: Edward Elgar Publishers, 1999.

"Delegated Expertise," *Journal of Accounting Research*, Vol. 25(1), Spring 1987, pp. 68-89 (with J. Demski).

"Awarding Monopoly Franchises," *The American Economic Review*, Vol. 77(3), June 1987, pp. 375-387 (with M. Riordan).

JOURNAL PUBLICATIONS (CONTINUED):

"Efficient Awards and Standards of Proof in Judicial Proceedings," *The Rand Journal of Economics*, Vol. 18(2), Summer 1987, pp. 308-315 (with D. Rubinfeld).

"Privatization, Information, and Incentives," *Journal of Policy Analysis and Management*, Vol. 6(4), Summer 1987, pp. 567-581 (with J. Stiglitz).

Reprinted in *The Political Economy of Privatization and Deregulation*, edited by E. Bailey and J. R. Pack. Cheltenham, England: Edward Elgar Publishers, 1995.

Also reprinted in *Privatisation and Corporate Performance*, edited by D. Parker. Cheltenham, England: Edward Elgar Publishers, 2001.

"Incentive Schemes with Multiple Agents and Bankruptcy Constraints," *Journal of Economic Theory*, Vol. 44(1), February 1988, pp. 156-167 (with J. Demski and P. Spiller).

"Regulating Without Cost Information: The Incremental Surplus Subsidy Scheme," *International Economic Review*, Vol. 29(2), May 1988, pp. 297-306 (with D. Sibley).

"Optimal Contracts with Public Ex Post Information," *Journal of Economic Theory*, Vol. 45(1), June 1988, pp. 189-199 (with M. Riordan).

Reprinted in *The Principal Agent Model: The Economic Theory of Incentives*, edited by J. Laffont. Cheltenham, UK: Edward Elgar Publishers, 2003.

"Commitment in Procurement Contracting," *The Scandinavian Journal of Economics: Special Issue on Information and Incentives in Organizations*, Vol. 90(3), September 1988, pp. 357 372 (with M. Riordan).

"Profiting from Countervailing Power: An Effect of Government Control," *International Journal of Industrial Organization*, Vol. 6(3), September 1988, pp. 323-333 (with W.J. Adams).

"Regulating a Monopolist with Unknown Demand and Cost Functions," *The Rand Journal of Economics*, Vol. 18(3), Autumn 1988, pp. 438-457 (with T. Lewis).

"Regulating a Monopolist with Unknown Demand," *The American Economic Review*, Vol. 78(5), December 1988, pp. 986-998 (with T. Lewis).

Reprinted in *Critical Ideas in Economics: Economic Regulation*, edited by P. Joskow. Cheltenham, England: Edward Elgar Publishers, 2000.

"Inflexible Rules in Incentive Problems," *The American Economic Review*, Vol. 79(1), March 1989, pp. 69-84 (with T. Lewis).

JOURNAL PUBLICATIONS (CONTINUED):

"Hierarchical Regulatory Control," *The Rand Journal of Economics*, Vol. 18(3), Autumn 1987, pp. 369-383 (with J. Demski).

"Hierarchical Structure and Responsibility Accounting," *The Journal of Accounting Research*, Vol. 27(1), Spring 1989, pp. 40-58 (with J. Demski).

"An Informational Effect When Regulated Firms Enter Unregulated Markets," *The Journal of Regulatory Economics*, Vol. 1(1), March 1989, pp. 35-46 (with T. Lewis).

"Regulatory Options and Price Cap Regulation," *The Rand Journal of Economics*, Vol. 20(3), Autumn 1989, pp. 405-416 (with T. Lewis).

"Second Sourcing," *The Rand Journal of Economics*, Vol. 20(1), Spring 1989, pp. 41-58 (with M. Riordan).

Reprinted in *The International Library of Critical Writings in Economics: The Economics of Defence*, edited by K. Hartley and T. Sandler. Cheltenham, England: Edward Elgar Publishers, 2001.

"Renegotiation and Specific Performance," *Law and Contemporary Problems: Special Issue on The Economics of Contract Law*, Vol. 52(1), Winter 1989, pp. 33-48 (with T. Lewis and M. Perry).

"Countervailing Incentives in Agency Problems," *Journal of Economic Theory*, Vol. 49(2), December 1989, pp. 294-313 (with T. Lewis).

Reprinted in *The Principal Agent Model: The Economic Theory of Incentives*, edited by J. Laffont. Cheltenham, UK: Edward Elgar Publishers, 2003.

"Fully Revealing Income Measurement," *The Accounting Review*, Vol. 65(2), April 1990, pp. 363-383 (with J. Demski).

"Regulating Without Cost Information: Further Thoughts," *International Economic Review*, Vol. 31(4), November 1990, pp. 1027-1029 (with D. Sibley).

"Sequential Regulatory Oversight," *The Journal of Regulatory Economics*, Vol. 2(4), December 1990, pp. 327-348 (with T. Lewis).

"Sharing Productive Knowledge in Internally Financed R&D Contests," *The Journal of Industrial Economics*, Vol. 39(2), December 1990, pp. 187-208 (with S. Bhattacharya and J. Glazer).

JOURNAL PUBLICATIONS (CONTINUED):

"Incentives in Principal-Agent Relationships," *The Journal of Economic Perspectives*, Vol. 5(2), Spring 1991, pp. 45-66.

"Resolving Double Moral Hazard Problems with Buyout Agreements," *The Rand Journal of Economics*, Vol. 22(2), Summer 1991, pp. 232-240 (with J. Demski).

"Oversight of Long-Term Investment by Short-Lived Regulators," *International Economic Review*, Vol. 32(3), August 1991, pp. 579-600 (with T. Lewis).

"Incentives for Monitoring Quality," *The Rand Journal of Economics*, Vol. 22(3), Autumn 1991, pp. 370-384 (with T. Lewis).

"All-or-Nothing Information Control," *Economics Letters*, Vol. 37(2), October 1991, pp. 111 113 (with T. Lewis).

"Technological Change and the Boundaries of the Firm," *The American Economic Review*, Vol. 81(4), September 1991, pp. 887-900 (with T. Lewis).

Reprinted in *The Theory of the Firm*, edited by M. Casson. Cheltenham, England: Edward Elgar Publishers, 1996.

Also reprinted in *The Theory of the Firm: Critical Perspectives on Business and Management*, edited by N. Foss. London: Routledge Publishers, 2000.

"Licensing and the Sharing of Knowledge in Research Joint Ventures," *Journal of Economic Theory*, Vol. 56(1), February 1992, pp. 43-69 (with S. Bhattacharya and J. Glazer).

"Strategic Nonlinear Pricing Under Price Cap Regulation," *The Rand Journal of Economics*, Vol. 23(1), Spring 1992, pp. 1-19 (with D. Sibley).

"Further Thoughts on Fully Revealing Income Measurement," *The Accounting Review*, Vol. 67(3), July 1992, pp. 628-630 (with J. Demski).

"Incentives for Conservation and Quality-Improvement by Public Utilities," *The American Economic Review*, Vol. 82(5), December 1992, pp. 1321-1340 (with T. Lewis).

"Regulatory Incentive Policies and Abuse," *The Journal of Regulatory Economics*, Vol. 5(2), June 1993, pp. 131-141 (with D. Sibley).

"Sourcing with Unverifiable Performance Information," *The Journal of Accounting Research*, Vol. 31(1), Spring 1993, pp. 1-20 (with J. Demski).

JOURNAL PUBLICATIONS (CONTINUED):

"Choosing Workers' Qualifications: No Experience Necessary?," *International Economic Review*, Vol. 34(3), August 1993, pp. 479-502 (with T. Lewis).

"Ignorance in Agency Problems," *Journal of Economic Theory*, Vol. 61(1), October 1993, pp. 169-183 (with T. Lewis).

"An Incentive Approach to Banking Regulation," *Journal of Finance*, Vol. 48(4), September 1993, pp. 1523-1542 (with R. Giammarino and T. Lewis).

"Designing Superior Incentive Regulation: Accounting for All of the Incentives All of the Time," *Public Utilities Fortnightly*, Vol. 132(4), February 15, 1994, pp. 12-15 (with D. Weisman).

"Designing Superior Incentive Regulation: Modifying Plans to Preclude Recontracting and Promote Performance," *Public Utilities Fortnightly*, Vol. 132(5), March 1, 1994, pp. 27-32 (with D. Weisman).

Reprinted in *Competition and Regulation in Energy Markets*, edited by S. Eyre and M. Pollitt. Cheltenham, England: Edward Elgar Publishing, 2016.

"Supplying Information to Facilitate Price Discrimination," *International Economic Review*, Vol. 35(2), May 1994, pp. 309-327 (with T. Lewis).

"Designing Optional No-Fault Insurance Policies for Health Care Systems," *Journal of Economics and Management Strategy*, Vol. 3(1), Spring 1994, pp. 113-142.

"Designing Incentive Regulation," *Review of Industrial Organization*, Vol. 9(3), June 1994, pp. 245-272.

"Toward a Benchmark for Optimal Prudency Policy," *The Journal of Regulatory Economics*, Vol. 7(2), March 1995, pp. 111-130 (with W. Encinosa).

"Insurance, Adverse Selection, and Cream-Skimming," *Journal of Economic Theory*, Vol. 65(2), April 1995, pp. 327-358 (with T. Lewis).

"Simple Regulatory Policies in the Presence of Demand and Cost Uncertainty," *Information Economics and Policy*, Vol. 7(1), April 1995, pp. 57-73 (with B. Blair and T. Lewis).

"Optimal Industrial Targeting with Unknown Learning-By-Doing," *The Journal of International Economics*, Vol. 38(3/4), May 1995, pp. 275-295 (with E. Dinopoulos and T. Lewis).

JOURNAL PUBLICATIONS (CONTINUED):

"Explaining the Choice Among Regulatory Plans in the U. S. Telecommunications Industry," *The Journal of Economics and Management Strategy*, Vol. 4(2), Summer 1995, pp. 237-265 (with S. Donald).

"Revisiting the Line-of-Business Restrictions," *Managerial and Decision Economics*, Vol. 16(4), July-August 1995, pp. 291-300.

Reprinted in *Deregulating Telecommunications: The Baby Bells' Case for Competition*, edited by R. Higgins and P. Rubin. Chichester, England: John Wiley & Sons, 1995.

"Using Markets to Allocate Pollution Permits and Other Scarce Resource Rights Under Limited Information," *The Journal of Public Economics*, Vol. 57(3), July 1995, pp. 431-455 (with T. Lewis).

"Optimal Capital Structure in Agency Relationships," *The Rand Journal of Economics*, Vol. 26(3), Autumn 1995, pp. 343-361 (with T. Lewis).

"Revisiting the Conditions for Fully Revealing Disclosure," *Journal of Business Finance and Accounting*, Vol. 23(3), April 1996, pp. 487-490 (with J. Demski).

"The Effects of Incentive Regulation in the Telecommunications Industry: A Survey," *The Journal of Regulatory Economics*, Vol. 9(3), May 1996, pp. 269-306 (with D. Kridel and D. Weisman).

Reprinted in *Critical Ideas in Economics: Economic Regulation*, edited by P. Joskow. Cheltenham, England: Edward Elgar Publishers, 2000.

"Potential Pitfalls in Empirical Investigations of the Effects of Incentive Regulation Plans in the Telecommunications Industry," *Information Economics and Policy*, Vol. 8(2), June 1996, pp. 125-140 (with D. Weisman).

"Revenue Sharing in Incentive Regulation Plans," *Information Economics and Policy*, Vol. 8(3), September 1996, pp. 229-248 (with D. Weisman).

"Competition Among Health Maintenance Organizations," *The Journal of Economics and Management Strategy*, Vol. 6(1), Spring 1997, pp. 129-150 (with W. Encinosa).

"Penalizing Success in Dynamic Incentive Contracts: No Good Deed Goes Unpunished?" *The Rand Journal of Economics*, Vol. 28(2), Summer 1997, pp. 346-358 (with T. Lewis).

JOURNAL PUBLICATIONS (CONTINUED):

"Information Management in Incentive Problems," *The Journal of Political Economy*, Vol. 105(4), August 1997, pp. 796-821 (with T. Lewis).

"Choosing Among Regulatory Options in the United States Telecommunications Industry," *The Journal of Regulatory Economics*, Vol. 12(3), November 1997, pp. 227-243 (with S. Donald).

"Access Pricing With Unregulated Downstream Competition," *Information Economics and Policy*, Vol. 11(1), March 1999, pp. 73-100 (with T. Lewis).

"Summarization with Errors: A Perspective on Empirical Investigations of Agency Relationships," *Management Accounting Research*, Vol. 10(1), March 1999, pp. 21-37 (with J. Demski).

"Setting the *X* Factor in Price Cap Regulation Plans," *The Journal of Regulatory Economics*, Vol. 16(1), July 1999, pp. 5-25 (with J. Bernstein).

"Employing Decoupling and Deep Pockets to Mitigate Judgment-Proof Problems," *The International Review of Law and Economics*, Vol. 19(2), June 1999, pp. 275-293 (with T. Lewis).

"Using Subjective Risk Adjusting to Prevent Patient Dumping in the Health Care Industry," *The Journal of Economics and Management Strategy*, Vol. 8(3), Fall 1999, pp. 351-382 (with T. Lewis).

"ACR Reforms to Promote HMO Participation in Medicare + Choice," *Health Care Financing Review*, Vol. 21(1), Fall 1999, pp. 19-29 (with W. Encinosa).

"How to Determine the *X* in *RPI - X* Regulation: A User's Guide," *Telecommunications Policy*, Vol. 24(1), February 2000, pp. 63-68 (with J. Bernstein).

"Contracting With Wealth-Constrained Agents," *International Economic Review*, Vol. 41(3), August 2000, pp. 743-767 (with T. Lewis).

"Motivating Wealth-Constrained Actors," *The American Economic Review*, Vol. 90(4), September 2000, pp. 944-960 (with T. Lewis).

"Optimal Contracting With Private Knowledge of Wealth and Ability," *The Review of Economic Studies*, Vol. 68(1), January 2001, pp. 21-44 (with T. Lewis).

JOURNAL PUBLICATIONS (CONTINUED):

"How Liable Should a Lender Be? The Case of Judgement Proof Firms and Environmental Risk: Comment," *The American Economic Review*, Vol. 91(3), June 2001, pp. 724-730 (with T. Lewis).

"The State of Performance-Based Regulation in the U.S. Electric Utility Industry," *The Electricity Journal*, Vol. 14(8), October 2001, pp. 71-79 (with G. Basheda, P. Hanser, and J. Pfeifenberger).

"The Impact of State Incentive Regulation on the U.S. Telecommunications Industry," *The Journal of Regulatory Economics*, Vol. 22(2), September 2002, pp. 133-159 (with C. Ai).

"Economic Issues at the Federal Communications Commission," *The Review of Industrial Organization*, Vol. 21(4), December 2002, pp. 337-356 (with E. Kwerel, J. Levy, R. Pepper, D. Stockdale, and J. Williams).

"Regulating Horizontal Diversification," *International Journal of Industrial Organization*, Vol. 21(3), March 2003, pp. 291-315.

"The Federal Communications Commission's Competition Policy and Marketing's Information Technology Revolution," *Journal of Public Policy & Marketing*, Vol. 22(1), Spring 2003, pp. 26-34 (with D. Stockdale).

"Incentives for Anticompetitive Behavior by Public Enterprises," *Review of Industrial Organization*, Vol. 22(3), May 2003, pp. 183-206 (with J.G. Sidak).

"The Effects of Incentive Regulation on Retail Telephone Service Quality in the United States," *Review of Network Economics*, Vol. 2(4), December 2003, pp. 355-375.

"Competition Law for State-Owned Enterprises," *Antitrust Law Journal*, Vol. 71(2), December 2003, pp. 479-523 (with J.G. Sidak).

"Competition Policy, Parity Regulation, and Self-Sabotage," *Info*, Vol. 6(1), February 2004, pp. 52-56 (with D. Weisman).

"Efficient Manipulation in a Repeated Setting," *Journal of Accounting Research*, Vol. 42(1), March 2004, pp. 31-49 (with J. Demski and H. Frimor).

"Toward a Synthesis of Models of Regulatory Policy Design with Limited Information," *The Journal of Regulatory Economics*, Vol. 26(1), July 2004, pp. 5-21 (with M. Armstrong).

JOURNAL PUBLICATIONS (CONTINUED):

"Wholesale Pricing and Local Exchange Competition," *Info*, Vol. 6(5), 2004, pp. 318-325 (with L. Wood and W. Zarakas).

"Incentive Regulation and Telecommunications Service Quality," *The Journal of Regulatory Economics*, Vol. 26(3), November 2004, pp. 263-285 (with C. Ai and S. Martinez).

"On the Design of Performance Measurement Plans in the Telecommunications Industry," *Telecommunications Policy*, Vol. 28(11), December 2004, pp. 801-820 (with L. Wood).

"Regulating Service Quality: A Survey," *The Journal of Regulatory Economics*, Vol. 27(2), March 2005, pp. 123-154.

Reprinted in *Developments in the Economics of Privatization and Regulation*, edited by M. Crew and D. Parker. Cheltenham: Edward Elgar Publishing Ltd., 2008.

"Self Sabotage," *The Journal of Regulatory Economics*, Vol. 27(2), March 2005, pp. 155-175 (with D. Weisman).

"Privately-Negotiated Input Prices," *The Journal of Regulatory Economics*, Vol. 27(3), May 2005, pp. 263-280 (with B. Unel).

"Reviewing the Impact of Incentive Regulation on U.S. Telephone Service Quality," *Utilities Policy*, Vol. 13(3), September 2005, pp. 201-210 (with C. Ai).

"On the Irrelevance of Input Prices for Make-or-Buy Decisions," *The American Economic Review*, Vol. 95(5), December 2005, pp. 1631-1638.

"Regulation in Vertically-Related Industries: Myths, Facts, and Policy," *Review of Industrial Organization*, Vol. 28(1), February 2006, pp. 3-16.

"The Effects of Reinsurance in Financing Children's Health Care," *Inquiry*, Vol. 43(1), Spring 2006, pp. 23-33 (with S. Aydede, A. Dick, B. Vogel, and E. Shenkman).

"Regulation, Competition, and Liberalization," *Journal of Economic Literature*, Vol. 44(2), June 2006, pp. 325-366 (with M. Armstrong).

Reprinted in *Developments in the Economics of Privatization and Regulation*, edited by M. Crew and D. Parker. Cheltenham: Edward Elgar Publishing Ltd., 2008.

"Audit Error," *The Journal of Engineering and Technology Management*, Vol. 23(1-2), March – June, 2006, pp. 4-17 (with J. Demski and H. Frimor).

JOURNAL PUBLICATIONS (CONTINUED):

"On the Design of Input Prices: Can TELRIC Prices Ever be Optimal?" *Information Economics and Policy*, Vol. 18(2), June 2006, pp. 197-215.

"On the Merits of Vertical Divestiture," *The Review of Industrial Organization*, Vol. 29(3), November 2006, pp. 171-191.

"Simple Cost-Sharing Contracts," *The American Economic Review*, Vol. 97(1), March 2007, pp. 419-428 (with L. Chu).

"Equity and Adverse Selection with Correlated Costs," *Economics Letters*, Vol. 95(3), June 2007, pp. 402-407 (with R. Desiraju).

"Incentives for Sabotage in Vertically-Related Industries," *The Journal of Regulatory Economics*, Vol. 31(3), June 2007, pp. 235-260 (with D. Mandy).

"Persistence of High Health Care Expenditures among Children in Medicaid," *Medical Care Research and Review*, Vol. 64(3), June 2007, pp. 304-330 (with E. Shenkman, C. Knapp, B. Vogel, and D. Schatz).

"Equity and Adverse Selection," *The Journal of Economics and Management Strategy*, Vol. 16(2), Summer 2007, pp. 285-318 (with R. Desiraju).

"The Bright Side of Supplier Encroachment," *Marketing Science*, Vol. 26(5), September-October 2007, pp. 651-659 (with A. Arya and B. Mittendorf).

"A Note on Optimal Procurement Contracts with Limited Direct Cost Inflation," *Journal of Economic Theory*, Vol. 137(1), November 2007, pp. 745-753 (with L. Chu).

"Outsourcing, Vertical Integration, and Price vs. Quantity Competition," *The International Journal of Industrial Organization*, Vol. 26(1), January 2008, pp. 1-16 (with A. Arya and B. Mittendorf).

"Does the Quality of Care in Medicaid MCOs Vary with the Form of Physician Compensation?" *Health Economics Letters*, Vol. 17(4), April 2008, pp. 545-550 (with T. Quast and E. Shenkman).

"Asset Revaluation Regulation with Multiple Information Sources," *The Accounting Review*, Vol. 83(4), July 2008, pp. 869-891 (with J. Demski and H. Lin).

JOURNAL PUBLICATIONS (CONTINUED):

"The Make-or-Buy Decision in the Presence of a Rival: Strategic Outsourcing to a Common Supplier," *Management Science*, Vol. 54(10), October 2008, pp. 1747-1758 (with A. Arya and B. Mittendorf).

"Procurement Contracts: Theory vs. Practice," *The International Journal of Industrial Organization*, Vol. 27(1), January 2009, pp. 51-59 (with L. Chu).

"Designing Input Prices to Motivate Process Innovation," *The International Journal of Industrial Organization*, Vol. 27(3), May 2009, pp. 390-402 (with Y. Chen).

"Implementing High-Powered Contracts to Motivate Intertemporal Effort Supply," *The Rand Journal of Economics*, Vol. 40(2), Summer 2009, pp. 296-316 (with L. Chu).

"Asset Revaluation Regulations," *Contemporary Accounting Research*, Vol. 26(3), Fall 2009, pp. 843-865 (with J. Demski and H. Lin).

"Equal Pay for Unequal Work: Limiting Sabotage in Teams," *The Journal of Economics and Management Strategy*, Vol. 19(1), Spring 2010, pp. 25-53 (with A. Bose and D. Pal).

"Innovation in Vertically Related Markets," *The Journal of Industrial Economics*, Vol. 58(2), June 2010, pp. 373-401 (with Y. Chen).

"On the Design of Piece-Rate Contracts," *Economics Letters*, Vol. 107(3), June 2010, pp. 330-332 (with A. Bose and D. Pal).

"Contracting with Private Knowledge of Signal Quality," *The Rand Journal of Economics*, Vol. 41(2), Summer 2010, pp. 244-269 (with L. Chu).

"Asymmetric Treatment of Identical Agents in Teams," *The European Economic Review*, Vol. 54(7), October 2010, pp. 947-961 (with A. Bose and D. Pal).

"Price Cap Regulation: What Have We Learned from Twenty-Five Years of Experience in the Telecommunications Industry?" *The Journal of Regulatory Economics*, Vol. 38(3), December 2010, pp. 227-257 (with D. Weisman).

"On the Performance of Linear Contracts," *The Journal of Economics and Management Strategy*, Vol. 20(1), Spring 2011, pp. 159-193 (with A. Bose and D. Pal).

"Pareto-Improving Inefficiency," *Oxford Economic Papers*, Vol. 63(1), January 2011, pp. 94-110 (with A. Bose and D. Pal).

JOURNAL PUBLICATIONS (CONTINUED):

"Exclusive Contracts, Innovation, and Welfare," *The American Economic Journal: Microeconomics*, Vol. 3(2), May 2011, pp. 194-220 (with Y. Chen).

"Managing Planning and Production Moral Hazard," *The Journal of Management Accounting Research*, Vol. 23, 2011, pp. 129-167 (with H. Lin).

"Regulating Regulators in Transitionally Competitive Industries," *The Journal of Regulatory Economics*, Vol. 41(1), February 2012, pp. 19-40 (with D. Weisman).

"Sabotaging Cost Containment," *The Journal of Regulatory Economics*, Vol. 41(3), June 2012, pp. 293-314 (with D. Pal and Y. Tang).

"Designing Optimal Gain Sharing Plans to Promote Energy Conservation," *The Journal of Regulatory Economics*, Vol. 42(2), October 2012, pp. 115-134 (with L. Chu).

"Extreme Screening Policies," *The European Economic Review*, Vol. 56(8), November 2012, pp. 1607-1620 (with A. Bose and D. Pal).

"Motivating Energy Suppliers to Promote Energy Conservation," *The Journal of Regulatory Economics*, Vol. 43(3), June 2013, pp. 229-247 (with L. Chu).

"Competitive Procurement of Auditing Services with Limited Information," *The European Accounting Review*, Vol. 43(3), September 2013, pp. 573-605 (with M. Causholli, R. Knechel, and H. Lin).

"On the Performance of Endogenous Access Pricing," *The Journal of Regulatory Economics*, Vol. 44(3), December 2013, pp. 237-250 (with K. Fjell and D. Pal).

"The Impact of Public Ownership in the Lending Sector," *The Canadian Journal of Economics*, Vol. 47(4), November 2014, pp. 1282-1311 (with A. Bose and D. Pal).

"Motivating Regulated Suppliers to Assess Alternative Technologies, Protocols, and Capital Structures," *The International Journal of Industrial Organization*, Vol. 37, November 2014, pp. 13-22 (with M. Jamison and D. Mandy).

"Welfare-Enhancing Fraudulent Behavior," *The Review of Accounting Studies*, Vol. 20(1), March 2015, pp. 343-370 (with H. Lin).

"Contracting with Private Knowledge of Production Capacity," *The Journal of Economics and Management Strategy*, Vol. 24(4), Winter 2015, pp. 752-785 (with L. Chu).

JOURNAL PUBLICATIONS (CONTINUED):

"All Entrepreneurial Productivity Increases are Not Created Equal," *The Southern Economic Journal*, Vol. 82(3), January 2016, pp. 952-974 (with A. Bose and D. Pal).

"When Do Auctions Ensure the Welfare-Maximizing Allocation of Scarce Inputs?" *The Rand Journal of Economics*, Vol. 47(1), Spring 2016, pp. 186-206 (with J. Mayo).

"The Price Cap Regulation Paradox in the Electricity Sector," *The Electricity Journal*, Vol. 29(3), April 2016, pp. 1-5 (with D. Weisman).

"The Disparate Adoption of Price Cap Regulation in the U.S. Telecommunications and Electricity Sectors," *The Journal of Regulatory Economics*, Vol. 49(2), April 2016, pp. 250-264 (with D. Weisman).

"On the Merits of Antitrust Liability in Regulated Industries," *The Journal of Law and Economics*, Vol. 59(2), May 2016, pp. 359-392 (with A. Bose and D. Pal).

"On the Optimal Design of Demand Response Policies," *The Journal of Regulatory Economics*, Vol. 49(3), June 2016, pp. 265-291 (with D. Brown).

"Regulation in a 'Deregulated' Industry: Railroads in the Post-Staggers Era," *The Review of Industrial Organization*, Vol. 49(2), September 2016, pp. 203-227 (with J. Mayo).

"Targeting Efforts to Raise Rivals' Costs: Moving from 'Whether' to 'Whom'," *The International Journal of Industrial Organization*, forthcoming (with J. Mayo and D. Mandy).

"Designing Compensation for Distributed Solar Generation: Is Net Metering Ever Optimal?" *The Energy Journal*, forthcoming (with D. Brown).

BOOKS/MONOGRAPHS:

Designing Regulatory Policy with Limited Information. London, England: Harwood Academic Publishers, 1987 (with D. Besanko).

Designing Incentive Regulation for the Telecommunications Industry. Cambridge, MA: The MIT Press, 1996 (with D. Weisman).

Information Economics: Critical Concepts in Economics. *Volumes I – IV*. New York, NY: Routledge, 2014 (co-edited with M. Baye).

Economics of Regulation and Antitrust. Fifth Edition. Cambridge, MA: The MIT Press, forthcoming (with K. Viscusi and J. Harrington).

BOOK CHAPTERS:

"Procurement and Quality Monitoring," in *Incentives in Procurement Contracting*, edited by J. Leitzel and J. Tirole. Westview Press, 1993, pp. 61-70 (with T. Lewis).

"Principles of Regulatory Policy Design," in *Infrastructure Delivery: Private Initiative and the Public Good*, edited by A. Mody. The World Bank, 1996, pp. 79-105.

"Seven Myths About Incentive Regulation," in *Pricing and Regulatory Innovations Under Increasing Competition*, edited by M. Crew. Kluwer Academic Publishers, 1996, pp. 1-20 (with D. Weisman).

"Horizontal Vicarious Liability," in *The Law and Economics of the Environment*, edited by A. Heyes. Edward Elgar Publishers, 2001, pp. 71-91 (with T. Lewis).

"Price Regulation," in *The Handbook of Telecommunications Economics. Volume I: Structure, Regulation, and Competition*, edited by M. Cave, S. Majumdar, and I. Vogelsang. Elsevier Science Publishers, 2002, pp. 225-293.

"Anticompetitive Behavior by State-Owned Enterprises: Incentives and Capabilities," in *Competing with the Government: Anticompetitive Behavior and Public Enterprises*, edited by R. Richard Geddes. Hoover Press, 2004, pp. 1-25 (with J. G. Sidak).

"Recent Developments in the Theory of Regulation," in *The Handbook of Industrial Organization, Volume 3*, edited by M. Armstrong and R. Porter. Elsevier Science Publishers, 2007, pp. 1557-1700 (with M. Armstrong).

BOOK CHAPTERS (CONTINUED):

"Pricing in Network Industries," in *The Oxford Handbook of Regulation*, edited by R. Baldwin, M. Cave, and M. Lodge. Oxford University Press, 2010, pp. 462-499 (with J. Hauge).

BOOK REVIEWS:

"Review of Berg and Tschirhart's *Natural Monopoly Regulation*," *Managerial and Decision Economics*, Vol. 11(1), February 1990, pp. 70-71.

"Review of Laffont and Tirole's *A Theory of Incentives in Procurement and Regulation*," *Journal of Economic Literature*, Vol. 32(2), June 1994, pp. 720-721.

"Review of Vogelsang and Mitchell's *Telecommunications Competition: The Last Ten Miles*," *Information Economics and Policy*, Vol. 9(4), December 1997, pp. 354-357.

"Review of Vogelsang and Mitchell's *Telecommunications Competition: The Last Ten Miles*," *Review of Industrial Organization*, Vol. 12(5-6), December 1997, pp. 837-840.

"Are Public Enterprises the Only Credible Predators?" *The University of Chicago Law Review*, Vol. 67(1), Winter 2000, pp. 271-292 (with G. Sidak).

"Review of Sclar's *You Don't Always Get What You Pay For: The Economics of Privatization*," *Journal of Economic Literature*, Vol. 39(2), June 2001, pp. 601-603.

"Review of De Bijl and Peitz's *Regulation and Entry into Telecommunications Markets*," *Journal of Economic Literature*, Vol. 42(2), June 2004, pp. 538-539.

OTHER PUBLICATIONS:

"Consumer Shopping Behavior in The Retail Coffee Market: A Comment," in *Proceedings of the Federal Trade Commission's Conference on Empirical Approaches to Consumer Protection Economics*, edited by P. Ippolito and D. Scheffman, 1986, pp. 445-446.

"Endogenous Commitment and Regulatory Design: A Comment on Levy and Spiller's *Regulation, Institutions, and Commitment in Telecommunications*," in *Proceedings of the World Bank Annual Conference on Development Economics*, edited by M. Bruno and B. Pleskovic. The World Bank, 1994, pp. 253-256.

"Comment on R. Geddes' 'Agency Costs and Governance in the United States Postal Service'," in *Governing the Postal Service*, edited by J. G. Sidak. American Enterprise Institute, 1994, pp. 140-143.

"Economic Theory of Regulation," in *The International Encyclopedia of the Social and Behavioral Sciences*, edited by N. Smelser and P. Baltes, Elsevier Science Publishers, 2001.

"Overview of the Special Issue – Marketing's Information Technology Revolution: Implications for Consumer Welfare and Economic Performance," *Journal of Public Policy & Marketing*, Vol. 22(1), Spring 2003, p. 3 (with A. Silk).

"Introduction," to *Information Economics: Critical Concepts in Economics*. *Volumes I – IV*. New York, NY: Routledge, 2014 (with M. Baye).

"Economic Theory of Regulation," in *The International Encyclopedia of the Social and Behavioral Sciences* (2nd Edition), edited by J. Wright. Oxford: Elsevier Ltd., 2015.

HONORS AND AWARDS:

2015	Distinguished Member Award Transportation and Public Utilities Group.
2015	Faculty Honoree, Anderson Scholars Program University of Florida.
2011 – 2014	Research Foundation Professorship, University of Florida.
2003	Distinguished Service Award, Public Utility Research Center University of Florida.
2000	Faculty Honoree, Anderson Scholars Program University of Florida.
1998	Professorial Excellence Program Award, University of Florida.
1997 – 2000	Research Foundation Professorship, University of Florida.
1992	Research Achievement Award, University of Florida.
1976	Inducted into the Phi Beta Kappa Society.

REFEREE/REVIEWER FOR:

Accounting Review
Addison Wesley, Publishers
American Economic Journals: Economic Policy, Microeconomics
American Economic Review
American Law and Economics Review
American Enterprise Institute
Bell Journal of Economics
Berkeley Electronic Press Journal of Economic Analysis and Policy
Bulletin of Economic Research
Cambridge University Press
China Economic Review
Danish Social Science Research Council
Economic Journal
Econometrica
Economic and Social Research Council
Economic Design
Economic Inquiry
Economics Letters
Economic Theory
Energy Economics
Energy Journal
Encyclopedia of Law and Economics
European Economic Review
European Journal of Operational Research
Games and Economic Behavior
Harcourt Brace, Publishers
International Economic Review
Information Economics and Policy
International Journal of Industrial Organization
International Journal of the Economics of Business
International Review of Law and Economics
Israel Science Foundation
Johns Hopkins University Press
John Wiley, Publishers
Journal of Accounting Research
Journal of the American Statistical Association
Journal of Business
Journal of Competition Law & Economics
Journal of Corporate Finance
Journal of Economic Behavior and Organization
Journal of Economic Dynamics and Control
Journal of Economic Literature
Journal of Economic Theory
Journal of Economics and Business
Journal of Economics and Management Strategy
Journal of Environmental Economics and Management
Journal of Health Economics
Journal of Industrial Economics
Journal of International Economics
Journal of Law and Economics
Journal of Law, Economics and Organization
Journal of Marketing Research
Journal of Policy Analysis and Management
Journal of Political Economy
Journal of Public Economics
Journal of Public Policy and Marketing
Journal of Regulatory Economics
Management Science
Managerial and Decision Economics
Marketing Science
MIT Press
National Science Foundation
Nonlinear Dynamics and Systems Theory
Oxford Economic Papers
Oxford University Press
Princeton University Press
Quarterly Journal of Economics
Quarterly Review of Economics and Business
Rand Journal of Economics
Research Grants Council of Hong Kong
Research in Labor Economics
Review of Economic Studies
Review of Economics and Statistics
Review of Industrial Organization
Review of Network Economics
Sloan Foundation
Southern Economic Journal
Telecommunications Policy
Utilities Policy
World Bank Economic Review

SELECTED ADDITIONAL EXPERIENCE:

1997 – Present	Instructor in *The International Training Program on Utility Regulation and Strategy*, sponsored by The World Bank and the University of Florida's Public Utility Research Center.
2016 – Present	Advisor to Norfolk Southern Corporation on The Design of Access Policy in the Railroad Industry.
2016 – Present	Advisor to the Canadian Bureau of Competition on Competition in the Wireless Telecommunications Sector.
2016	Advisor to the Alliance of Automobile Manufacturers on The Impact of Safety Recall Legislation in the Automobile Industry.
2015 – Present	Advisor to Sprint Corporation on The Design of Regulatory Policy for Business Data Services.
2014 – 2015	Advisor and Expert Witness for Norfolk Southern Corporation on The Design of Regulatory Policy in the Railroad Industry.
2014 – 2015	Advisor and Expert Witness for DISH Network on The Design of Competition Policy in Broadband and Media Markets.
2014 – 2015	Advisor to EPCOR Utilities Incorporated on The Design of Performance Based Regulation in the Energy Sector.
2014	Advisor to COFETEL, Mexico's Telecommunications Regulator on Price Cap Regulation in Mexico's Telecommunications Industry.
2013 – 2014	Advisor and Expert Witness for the Alliance of Automobile Manufacturers On Warranty Repair Compensation Policy in the Automobile Industry.
2013	Advisor to AT&T on The Design of Spectrum Auctions.
2013	Advisor to Telefonica on The Design of Price Cap Regulation in Peru.
2013	Advisor to the National Grid Service Company on The Design of Service Quality Standards in the Electricity Sector.
2011	Advisor to Leap Wireless International on Competition Policy in the Wireless Communications Industry.

SELECTED ADDITIONAL EXPERIENCE (CONTINUED):

2011	Advisor to Telstra Corporation, Ltd. on the Design of Access Pricing Policy in Australia's Telecommunications Industry.
2010	Advisor to COFETEL on Competition Policy in Mexico's Communications Industry.
2010	Advisor to the U.S. Federal Communications Commission on Incentive Regulation and Broadband Deployment.
2009	Advisor to the OECD on Competition Policy in Mexico's Communications Industry.
2009	Advisor to Afilias on the Design of Policy to Assign Internet Names and Addresses.
2008 – 2009	Advisor and Expert Witness for AT&T on the Design of Competition Policy in the U.S. Telecommunications Industry.
2008	Member of Advisory Committee to the "Electronic Health Information Exchange Project," sponsored by the National Governors Association.
2008	Advisor to United States Cellular Corporation on the Design of Telecommunications Universal Service Policy.
2007 – 2008	Advisor to United Parcel Service on the Design of Regulatory Policy in the Postal Industry.
2006 – 2007	Advisor to Earthlink, Inc. on the Design of Telecommunications and Internet Competition Policy.
2006 – 2007	Advisor to Telstra Corporation, Ltd. on the Design of Competition Policy in Australia's Telecommunications Industry.
2005 – 2006	Advisor to General Communication, Inc. on the Design of Telecommunications Competition Policy.
2005	Advisor to United Parcel Service on Competition Policy in the U.S. Postal Industry.
2004 – 2005	Advisor to the Antitrust Division of the U.S. Department of Justice on Competition Policy in the Telecommunications Industry.

SELECTED ADDITIONAL EXPERIENCE (CONTINUED):

2004	Advisor to OSIPTEL, Peru's Telecommunications Regulatory Agency, on the Design of Price Cap Regulation
2003 – 2004	Advisor to SBC, Inc. on the Design of Performance Measurement Systems in the U.S. Telecommunications Industry.
2003	Presented Invited Testimony to the President's Commission on the United States Postal Service.
2003	Advisor to General Communication, Inc. on the Design of Universal Service and Competition Policy.
2001	Advisor to CONATEL, Ecuador's Central Regulatory Body on the Design of Telecommunications Policy.
2000 – 2001	Advisor to Ameren UE on the Design of Incentive Regulation for Electric Utilities.
1999 – 2000	Advisor to the Antitrust Division of the U. S. Department of Justice on a Proposed Merger in the Communications Industry.
1998 – 2000	Consultant and Expert Witness for United Parcel Service on Postal Industry Pricing.
1998 – 2000	Advisor to the World Bank on Telecommunications Privatization in Africa.
1996	Consultant and Expert Witness for TELUS Communications, Inc. on the Design of Price Cap Regulation.
1995	Advisor and Expert Witness for GTE-California on Incentive Regulation and Telecommunications Competition Policy.
1992 – 1994	Advisor to the Southern Bell Telephone Company on the Design of Incentive Regulation.
1992	Advisor to the New York State Public Service Commission on Incentive Regulation in the Electric Power Industry.

Before the Surface Transportation Board

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

Reciprocal Switching

Verified Statement of Randall Lutter, PhD[1]

I. Introduction

I am Randall Lutter, Professor of Public Policy at the Frank Batten School of Leadership and Public Policy at the University of Virginia, where I teach benefit-cost analysis. I have extensive professional and academic expertise in conducting, evaluating and using economic analyses of regulations and specifically benefit-cost analyses. I have served as senior economist in the Office of Information and Regulatory Affairs at the White House Office of Management and Budget (OMB) and as senior economist for regulation and the environment at the President's Council of Economic Advisers. I am the author or co-author of more than two dozen peer-reviewed papers and book chapters about applications of economics to various regulatory matters. While in federal service, I contributed to OMB's best practices documents and guidelines for the conduct of economic analysis of regulations. My curriculum vitae further describes my background and expertise and is included as Attachment B to this statement.

I have been asked by Norfolk Southern Railway Co. to review the Surface Transportation Board's recent Notice of Proposed Rulemaking in the above-referenced proceeding ("Petition for

[1] I testify in my individual capacity and so my views do not necessarily reflect those of any organization with which I am or have been affiliated.

Rulemaking To Adopt Revised Competitive Switching Rules; Reciprocal Switching") (henceforth, NPRM), (81 FR 51149), and to comment on the apparent lack of any economic analysis of the benefits and costs associated with the proposed rule.

As noted in the NPRM, in response to a petition from the National Industrial Transportation League (NITL), the Board is proposing to modify its standards for reciprocal switching. Reciprocal switching arrangements enable a competing carrier to offer its own single-line rate to compete with that of an incumbent carrier, when the competing carrier's lines do not physically reach a shipper's facility (81 FR 51150). Reciprocal switching is one of three competitive access remedies available to shippers and carriers under the Interstate Commerce Act (81 FR 51150).

The Board's current policy is to mandate reciprocal switching only if an incumbent railroad has engaged or is likely to engage in conduct that is contrary to rail transportation policy or is otherwise anticompetitive (81 FR 51150). In assessing anticompetitive conduct, the essential questions for the Board are whether the railroad used its market power to extract unreasonable terms or showed a disregard for the shipper's needs by furnishing inadequate service. In its NPRM, the Board notes that

> Since adoption of the agency's competitive access regulations in 1985, the regulations have not changed substantively. Few requests for reciprocal switching have been filed with the agency since then, and in none of those cases has the Board granted a request for reciprocal switching. (81 FR 51150).

The proposed rule would change existing policy by lowering the bar for mandatory reciprocal switching. The Board describes the new policy by stating

> We propose a two-pronged approach, pursuant to which the Board would have the ability to order reciprocal switching either when it is practicable and in the public interest or when it is necessary to provide competitive rail service. The two-pronged approach would be consistent with the rail transportation policy in weighing issues such as competition and market

> power, rail service needs (for complaining and non-complaining shippers), the impact on the involved carriers, and whether specific facilities are appropriate for particular switching operations. (81 FR 51156)

Thus the Board's proposed rule would allow it to mandate reciprocal switching even when there is no evidence of anti-competitive conduct, provided the Board finds either that such switching is practicable and in the public interest, or that it is otherwise necessary to provide competitive rail service. The proposed rule did not identify the "problem" that it is meant to remedy. The fact that few cases have been filed under the existing rules is not itself evidence of a "problem" requiring such a significant change in regulation.

While the proposed rules allow for case-by-case determinations, they also offer guidelines and limits on the nature of these determinations. Section 1145.2(a)(1) lists three necessary conditions for the Board to find that a proposed switching arrangement is practicable and in the public interest; the third of these (Section 1145.2(a)(1)(iii)), in turn lists eight separate non-exclusive factors that the Board may consider. Section 1145.2(a)(2) identifies three conditions that together would imply that the Board will find a switching arrangement to be necessary to provide competitive rail service, provided that a fourth condition is not satisfied. The fourth condition, Section 1145.2(a)(2)(iv), provides that a switching arrangement will not be established under this section if either rail carrier between which such switching is sought to be established shows that the proposed switching is not feasible or is unsafe, or that the presence of such switching will unduly hamper the ability of that carrier to serve its shippers. Thus the proposed rule would lower the bar to mandate reciprocal switching arrangements and at the same time provide for new and arguably less predictable criteria for mandating such arrangements.

As outlined below, the NPRM reflects the type of policy decision that ordinarily would and should be the subject of a regulatory impact analysis, or a benefit-cost analysis.

In Section II, I show that the Rail Transportation Policy of 49 U.S.C. § 10101 and the Congressional Review Act strongly support the need for the STB to conduct an economic analysis of its reciprocal switching NPRM. In Section III, I show that failure to conduct such an analysis is inconsistent with long-standing executive orders and best practices for economic analysis of the impact of regulations. In Section IV, I demonstrate that distinguished scholars and practitioners from a variety of disciplines and backgrounds agree that conducting benefit-cost analyses of major regulatory decisions is necessary for sound policy decisions.

II. Statutory Reasons to Conduct a Benefit-Cost Analysis

The STB issued the reciprocal switching NPRM without having first conducted any economic analysis of regulatory impacts or any benefit-cost analysis. The agency has described its proposed rule as shifting toward a case-by-case review based on more information than simply whether the incumbent railroad exhibited anti-competitive conduct. This change in policy is precisely the type of regulation for which an economic analysis is required, consistent with the intent of the Rail Transportation Policy and Congressional Review Act.

A. Rail Transportation Policy

The Rail Transportation Policy (RTP), codified at 49 U.S.C. §§ 10101, mentions basic economic concepts in several places. It states that it is the policy of the U.S. to allow [italics added]

> (1) To the maximum extent possible, *competition* and *the demand for services* to *establish reasonable rates* for transportation by rail;
>
> (2) To minimize the need for Federal regulatory control over the rail transportation system and to require fair and expeditious regulatory decisions when regulation is required;
>
> (3) To promote a safe and *efficient* rail transportation system by allowing rail carriers to earn adequate revenues, as determined by the Board;

(4) To ensure the development and continuation of a sound rail transportation system with effective *competition* among rail carriers and with other modes, to meet the needs of the public and the national defense;

(5) To foster sound economic conditions in transportation and to ensure effective *competition* and coordination between rail carriers and other modes;

The RTP's repeated references to competition, to the need to allow "demand for services to establish reasonable rates," and to the need to promote efficient transportation systems clearly call for use of economic analysis to inform policy decisions, since competition, demand, and efficiency are fundamentally economic concepts. The RTP's language is difficult to reconcile with the complete lack of economic analysis by the STB in support of the reciprocal switching NPRM.

Thus, the STB's decision to issue the reciprocal switching NPRM without conducting economic analysis to verify whether it promotes competition and efficiency and incorporates the role of demand in establishing transportation rates, as called for by the RTP, is not giving effect to this congressional policy.

B. Congressional Review Act

The critical need for the Board to consider the economic impact of its regulations is further supported by the Congressional Review Act (CRA). The CRA creates requirements with which agencies cannot comply without some economic analysis of federal regulation. Section 801(a)(A) of the CRA states

> Before a rule can take effect, the Federal agency promulgating such rule shall submit to each House of the Congress and to the Comptroller General a report containing—
>
> (i) a copy of the rule;
>
> (ii) a concise general statement relating to the rule, including whether it is a major rule

The CRA clarifies in Section 804(2)

> The term "major rule" means any rule that the Administrator of the Office of Information and Regulatory Affairs of the Office of Management and Budget finds has resulted in or is likely to result in—
>
> (A) an annual effect on the economy of $100,000,000 or more
>
> (B) a major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions; or
>
> (C) significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of United States-based enterprises to compete with foreign-based enterprises in domestic and export markets.

These provisions essentially direct agencies to flag publicly for Congress which of the rules they issue are "major." Agencies generally cannot comply with this requirement without conducting sufficient analysis to determine whether the annual effect of a rule exceeds this threshold. A determination at only the final rule stage about whether or not the reciprocal switching rule is major would be inappropriate because such an action would deny the public an opportunity to comment on such a determination. Issuing the NPRM without a statement about whether or not it is major was inconsistent with the CRA because it does not signal publicly the importance of this rule.

There are several indications that the STB believes the impact of the rule to be significant. For example, in its July 25, 2012 order in response to NITL's petition, the STB asked for further clarification on "the impact on the railroad industry, including its financial condition, and network efficiencies or inefficiencies (including the potential for increased traffic)." And in 2013, the Department of Transportation provided some useful data in response, including effects of NITL's petition on railroad revenue, the rail network, and shippers, both those who could take advantage and those who might not qualify (DOT Opening Comments, Ex Part 711 (filed Mar. 1, 2013)). The DOT Opening Comments analyzed four Class I railroads, and found that

shipments representing about $1.1 billion in annual revenues would be potentially affected by the NITL's proposed revenue to variable costs and 30-mile tests.

The total value of shipments affected by the NPRM would likely be higher than the DOT's 2013 estimate for the "subset" affected by the NITL proposal, because the NPRM represents a more expansive approach as it provides for no clear test for the ratio of revenue to variable costs or distance to a working interchange. Indeed, Vice Chairman Miller's described the NPRM as a "major rulemaking." (NPRM at 31).

Thus, the STB's decision to issue the reciprocal switching NPRM without conducting appropriate analysis to assess its economic effects failed to give effect to the CRA.

III. Executive Orders Requiring Benefit-Cost Analysis of Regulatory Decisions

The STB's failure to perform benefit-cost analysis of its NPRM also runs roughshod over multiple executive orders that underscore the need for such analysis by federal agencies—including independent regulatory agencies like the STB. President Ronald Reagan in his 1981 E.O. 12291 directed executive agencies to conduct benefit-cost analysis prior to undertaking significant regulatory decisions. President Bill Clinton in 1993 gave similar directions to executive agencies in his E.O 12866, on "Regulatory Planning and Review". E.O. 12866 states in section 1(b),

> (6) Each agency shall assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs.
>
> (7) Each agency shall base its decisions on the best reasonably obtainable scientific, technical, economic, and other information concerning the need for, and consequences of, the intended regulation.

Further, E.O. 12866 clarifies in Section 6(a)(3)(C) that agencies shall provide to OIRA a benefit-cost analysis, specifically,

(i) An assessment, including the underlying analysis, of benefits anticipated from the regulatory action (such as, but not limited to, the promotion of the efficient functioning of the economy and private markets, the enhancement of health and safety, the protection of the natural environment, and the elimination or reduction of discrimination or bias) together with, to the extent feasible, a quantification of those benefits;

(ii) An assessment, including the underlying analysis, of costs anticipated from the regulatory action (such as, but not limited to, the direct cost both to the government in administering the regulation and to businesses and others in complying with the regulation, and any adverse effects on the efficient functioning of the economy, private markets (including productivity, employment, and competitiveness), health, safety, and the natural environment, together with, to the extent feasible, a quantification of those costs; and

(iii) An assessment, including the underlying analysis, of costs and benefits of potentially effective and reasonably feasible alternatives to the planned regulation, identified by the agencies or the public (including improving the current regulation and reasonably viable nonregulatory actions), and an explanation why the planned regulatory action is preferable to the identified potential alternatives.

For more than twenty years regulatory agencies covered by this executive order have conducted and published economic analyses of the impacts of their regulations when they publish proposed and final rules.

President Barack Obama has endorsed these principles in issuing his own executive orders reinforcing the importance of benefit-cost analysis in regulatory policy. E.O. 13563, signed in 2011, states that E.O. 12866 is still in effect. E.O. 13563 states that the regulatory system "must take into account benefits and costs, both quantitative and qualitative" (Section 1(a)), and that "each agency must, among other things: (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs." Section 1(b)(1).

President Obama has moved to extend the reach of these ideas to independent regulatory agencies. His E.O. 13579 clarifies, in Section 1, that E.O. 13563 should be applicable to independent agencies as well as executive branch agencies:

> (b) Executive Order 13563 of January 18, 2011, "Improving Regulation and Regulatory Review," directed to executive agencies, was meant to produce a regulatory system that protects "public health, welfare, safety, and our environment while promoting economic growth, innovation, competitiveness, and job creation." Independent regulatory agencies, no less than executive agencies, should promote that goal.
>
> (c) Executive Order 13563 set out general requirements directed to executive agencies concerning public participation, integration and innovation, flexible approaches, and science. To the extent permitted by law, independent regulatory agencies should comply with these provisions as well.

At the time that it was issued, the heads of the Federal Communications Commission, the Federal Trade Commission, and the Consumer Product Safety Commission as well as the Federal Energy Regulatory Commission all made public statements supporting the President's action.[2]

A serious effort to comply with these directives has been longstanding practice among executive branch agencies and a number of independent regulatory agencies for some time. Fraas and Lutter (2011), for example, point out that the Nuclear Regulatory Commission has had guidelines to conduct economic analysis consistent with E.O. 12866 since 2004. They also mention that the Securities and Exchange Commission has taken steps to conduct more economic analysis of its regulations. Fraas and Lutter (2016) have also pointed to the economic analysis conducted by the Consumer Financial Protection Board in support of a regulation regarding disclosures applicable to residential mortgages.

The White House Office of Management and Budget, for years charged with ensuring the quality of regulatory impact analyses (also known as benefit-cost analyses), produced by executive branch agencies, described such analyses as follows:

> Benefit-cost analysis is a primary tool used for regulatory analysis. Where all benefits and costs can be quantified and expressed in monetary units, benefit-cost analysis provides decision makers with a clear indication of

[2] *See* White House blog at https://www.whitehouse.gov/blog/2011/07/11/president-s-executive-order-improving-and-streamlining-regulation-independent-regula .

> the most efficient alternative, that is, the alternative that generates the largest net benefits to society (ignoring distributional effects). This is useful information for decision makers and the public to receive, even when economic efficiency is not the only or the overriding public policy objective. (Office of Management and Budget, 2003, Circular A-4).

The Obama Administration reiterated support for benefit-cost analysis and Circular A-4 by releasing a primer on Circular A-4, which helpfully adds:

> After identifying a set of potential regulatory approaches, the agency should conduct a benefit-cost analysis that estimates the benefits and costs associated with each alternative approach. The benefits and costs should be quantified and monetized to the extent possible, and presented in both physical units (e.g., number of illnesses avoided) and monetary terms.

The STB's NPRM on reciprocal switching provides no evidence that the STB undertook a benefit-cost analysis or other economic analysis of its proposed rule prior to issuing it. The lack of such analysis in the proposed rule is inconsistent with the executive orders cited above, as well as accepted conventions and best practices regarding the issuance of federal rules.

IV. Support for Benefit-Cost Analysis Among Noted Academics and Former Federal Officials

The STB's failure to perform a benefit-cost analysis on a rulemaking like the NPRM is also at odds with the views of noted academics and federal officials. The use of prospective benefit-cost analysis to inform policy makers and the public when developing new regulations is taken as a given by economists from across the political spectrum.

Professor Joseph Stiglitz, a recipient of the Nobel Memorial Prize in Economic Sciences (2001), as well as former chair of the President's Council of Economic Advisers, observed in his textbook, "Economics and the Public Sector":

> Cost-benefit analysis provides a systematic set of procedures by which the government can assess to undertake some project or program and, when there is a choice of projects or programs, which project or program should be undertaken.

Cass Sunstein, noted legal scholar and former head of the Office of Information and Regulatory Affairs (OIRA) in the Obama Administration, authored an article in Bloomberg View (2012) entitled "The Stunning Triumph of Cost Benefit Analysis." He wrote:

> Republicans and Democrats have come to agree on one issue: the essential need for cost-benefit analysis in the regulatory process.
>
> In fact, cost-benefit analysis has become part of the informal constitution of the U.S. regulatory state.

He then concludes:

> What is remarkable is that all of these (regulatory) issues are being addressed under a framework that is now broadly shared. Endorsed for more than three decades and by five presidents, cost-benefit analysis is here to stay.

Professor Kenneth Arrow, a recipient of the Nobel Memorial Prize in Economic Sciences, and several distinguished co-authors explained that:

> Because society has limited resources to spend on regulation, benefit-cost analysis can help illuminate the trade-offs involved in making different kinds of social investments. In this regard, it seems almost irresponsible to not conduct such analyses, because they can inform decisions about how scarce resources can be put to the greatest social good. (Arrow et al., 1996)

Arrow et al. then articulated eight principles for benefit-cost analysis, the third of which states, "Benefit-cost analysis should be required for all major regulatory decisions."

V. Conclusion

Benefit-cost analysis has become an accepted and essential part of federal practices for significant regulatory decisions, supported by various executive orders and statutes. It is seen as a straightforward and routine way of complying with a directive that dates from President Clinton's 1993 Executive Order: In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. That same executive order states each agency shall assess both the costs and the

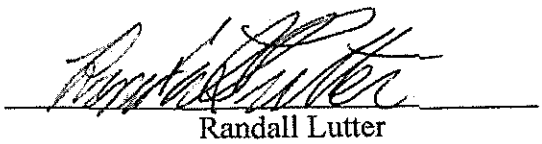
benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. And, the motivating rationales for this executive order apply equally to independent regulatory agencies like the STB.

The STB did not conduct a benefit-cost analysis for its proposed rule on reciprocal switching and so ignores longstanding norms for federal rulemaking. The analysis that it should have conducted is generally seen as necessary and helpful to inform policy makers, the public, and reviewing courts about the economic merit of different policy choices reflected in new rules. Indeed in my judgment, such an analysis is essential to ensuring that regulatory policy decisions are based upon a reasoned determination of whether the benefits justify the costs, a determination that has been a key part of federal regulatory policy at least since President Clinton signed E.O. 12866 in 1993.

VERIFICATION

I declare under penalty of perjury that the foregoing statement is true and correct. I further certify that I am qualified and authorized to file this testimony.

October 24. 2016



Randall Lutter

Attachment A - References

Arrow, K. J., M. L. Cropper, G. C. Eads, R. W. Hahn, L. B. Lave, R. G. Noll, P. R. Portney, M. Russell, R. Schmalensee, V. K. Smith, and R. N. Stavins. "Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation?" *Science* 272, no. 5259 (1996): 221-22. doi:10.1126/science.272.5259.221.

Arthur G. Fraas and Randall Lutter, 2016, "How Effective Are Federally Mandated Information Disclosures?" *Journal of Benefit-Cost Analysis* / Volume 7 / Issue 02 / Summer 2016, pp 326-349.

Arthur Fraas and Randall Lutter, "On the Economic Analysis of Regulations at Independent Regulatory Commissions: Would Greater Use of Economic Analysis Improve Regulatory Policy at Independent Regulatory Commissions? " 63 *Administrative Law Review*, 2011, Vol 63, p.213.

Office of Management and Budget, "Circular A-4 of September 17, 2003, Regulatory Analysis" 2003. Available at https://www.whitehouse.gov/sites/default/files/omb/assets/regulatory_matters_pdf/a-4.pdf

Office of Management and Budget, "Circular A-4 Primer, Regulatory Impact Analysis: A Primer" 2011. Available at https://www.whitehouse.gov/sites/default/files/omb/inforeg/regpol/circular-a-4_regulatory-impact-analysis-a-primer.pdf

President Clinton, Executive Order 12866 of September 30, 1993, Regulatory Planning and Review. *Federal Register*, Volume 58 (1993): 51735.

President Obama, Executive Order 13563 of January 18, 2011, Improving Regulation and Regulatory Review. *Federal Register*, Volume 76 (2011): 3821.

President Obama, Executive Order 13579 of July 11, 2011, Regulation and Independent Regulatory Agencies. *Federal Register*, Volume 76 (2011): 41587.

President Reagan, Executive Order 12291 of February 17th 1981, Federal Regulation. *Federal Register*, Volume 46 (2001): 13193.

Stiglitz, Joseph. *Economics and the Public Sector.* Norton and Company: New York City, 1986.

Sunstein, Cass. "The Stunning Triumph of Cost Benefit Analysis." *Bloomberg View*, 2012. https://www.bloomberg.com/view/articles/2012-09-12/the-stunning-triumph-of-cost-benefit-analysis

Surface Transportation Board. "Petition for Rulemaking To Adopt Revised Competitive Switching Rules; Reciprocal Switching." *Federal Register* 81, no 149. (August 3, 2016): 51149.

Attachment B
to
Verified Statement
of
Randall Lutter, PhD
to
Opening Comments of
Norfolk Southern Railway Company

Ex Parte No. 711
Reciprocal Switching

October 2016

Randall Lutter, Ph.D.

Professor of Public Policy
Frank Batten School of Leadership and Public Policy
University of Virginia, Charlottesville, VA
Randall.Lutter@virginia.edu
240 271 8430

Visiting Fellow
Resources for the Future
Washington D.C.
Lutter@rff.org

Randall Lutter is Professor of Public Policy at the Frank Batten School of Leadership and Public Policy at the University of Virginia and Visiting Fellow at Resources for the Future in Washington D.C. He has more than 25 years senior experience in the management and evaluation of regulatory programs to protect health, safety and the environment.

From 2003 to 2009, Lutter served at the Food and Drug Administration in different capacities, including as Chief Economist and Deputy Commissioner for Policy. He played a leadership role developing new policies affecting regulation of genetically engineered animals, animal clones, prevention of mad cow disease, user fee programs for new drugs and devices, communicating risks from unapproved imported drugs, and the management of FDA's advisory committees and strategic planning. Lutter also served at the Office of Management and Budget in the Office of Information and Regulatory Affairs from 1991 to 1997 and in 2009-2010, and from 1997 to 1998 he was senior economist for regulation and the environment at the President's Council of Economic Advisers.

Lutter was resident scholar with the American Enterprise Institute and fellow with the AEI-Brookings Joint Center for Regulatory Studies, where he wrote about a variety of regulatory approaches to address health, safety and environmental risks, covering topics from air pollution and greenhouse gases, to toxic substances, food safety and genetically engineered animals. He taught at the State University of New York at Buffalo after earning a Ph.D. in economics at Cornell University. With Jason F. Shogren, he co-edited *Painting the White House Green: Rationalizing Environmental Policy Inside the Executive Office of the President,* 2004, RFF Press. He has testified before Congressional committees. His work has appeared in the *American Economic Review*, *Environmental Science & Technology,* the *Journal of Political Economy, Risk Analysis, Science* and the *Administrative Law Review* as well as publications like *Politico* and *Regulation.*

Academic Research

Manuscripts / Works in Progress

Arindam Nandi, Randall Lutter and Ramanan Laxminarayan, "The Association between Breastfeeding and Future Schooling Outcomes and Educational Performance: Longitudinal Evidence from India" July 2016. An earlier version was presented at the Annual Meetings of the Society for Risk Analysis, Washington D.C., 2015.

Randall Lutter, "Federal Fish Consumption Advice: What Role for Science?" Report to RFF / UMd project on science and decision-making. October 2014.

Peer-Reviewed Articles

1. Arthur G. Fraas and Randall Lutter, 2016, "How Effective Are Federally Mandated Information Disclosures?" *Journal of Benefit-Cost Analysis* / Volume 7 / Issue 02 /

Summer 2016, pp 326-349. An earlier version of this paper was presented at the annual meetings of the Society for Risk Analysis, December 2013, the Society for Benefit-Cost Analysis, March 2014, and at a conference "Does Disclosure Have a Future?" at the University of Virginia Law School.

2. Randall Lutter, Linda Abbott, Rick Becker, Chris Borgert, Ann Bradley, Gail Charnley, Susan Dudley, Alan Felsot, Nancy Golden, George Gray, Daland Juberg, Mary Mitchell, Nancy Rachman, Lorenz Rhomberg, Keith Solomon, Stephen Sundlof, and Kate Willett, 2015, "Improving Weight of Evidence Approaches to Chemical Evaluations", *Risk Analysis* Article first published online: 16 DEC 2014 DOI: 10.1111/risa.12277. http://onlinelibrary.wiley.com/doi/10.1111/risa.12277/full

3. Randall Lutter, 2014, "A Bounding Analysis of the Benefits of Reducing Perchlorate Concentrations in Drinking Water", *Risk Analysis,* Oct 5; 34(10):1944-56. Epub 2014 Sep 5.

4. Randall Lutter, 2013, "The Role of Retrospective Analysis and Review in Regulatory Policy," *Journal of Benefit-Cost Analysis*. 4(1):17-38. Senators Ron Johnson and Mark Warner cited an earlier version of this paper in a July 3, 2012 letter requesting that the General Accountability Office report on federal agencies' retrospective regulatory reviews.

5. Randall Lutter, Craig Barrow, Christopher J. Borgert, James W. Conrad Jr., Debra Edwards, Allan Felsot, 2013, "Data Disclosure for Chemical Evaluations", *Environmental Health Perspectives* 121:145–148. http://dx.doi.org/10.1289/ehp.1204942 Lutter et al. also replied to a letter to the editor of *EHP* regarding this article, at http://ehp.niehs.nih.gov/1206438r/ .

6. Chessa Lutter and Randall Lutter, "Fetal and Early Childhood Undernutrition, Mortality and Lifelong Health", *Science,* 337:1495-99. September 21, 2012. http://www.sciencemag.org/content/337/6101/1495

7. Art Fraas and Randall Lutter, "Uncertain Benefits Estimates for Reductions in Fine Particle Concentrations", *Risk Analysis, An International Journal,* August 2012. DOI: 10.1111/j.1539-6924.2012.01883.x http://onlinelibrary.wiley.com/doi/10.1111/j.1539-6924.2012.01883.x/abstract. Cited in Forbes, July 29th, 2013. Also, Fraas and Lutter, 'Reply to Letter by Fann, Lamson, Anenberg, and Hubbell, Regarding Fraas & Lutter Article: "Uncertain Benefits Estimates for Reductions in Fine Particle Concentrations"', *Risk Analysis, An International Journal* 2013, doi: 10.1111/risa.12043

8. Art Fraas and Randall Lutter, 2012, "Efficient Pollution Regulation: Getting the Prices Right: Comment," *American Economic Review*, 102(1): 602–07, 2012. DOI:10.1257/aer.102.1.602, http://www.aeaweb.org/articles.php?doi=10.1257/aer.102.1.602 An earlier version

appeared as RFF Discussion Paper 11-36.

9. Art Fraas and Randall Lutter, "The Challenges of Improving the Economic Analysis of Pending Regulations: The Experience of OMB Circular A-4", *Annual Review of Resource Economics,* 3:71-85, 2011, DOI: 10.1146/annurev-resource-083110-120042, http://www.annualreviews.org/doi/abs/10.1146/annurev-resource-083110-120042 An earlier version of this paper appeared as RFF Discussion Paper 10-54.

10. Vernon, John A., Joseph Golec, Randall Lutter, and Clark Nardinelli, "An Exploratory Study of FDA New Drug Review Times, Prescription Drug User Fee Acts, and R&D Spending", *The Quarterly Review of Economics and Finance*, Vol. 49, Issue 4, Pages 1260-1274, November 2009. An earlier version of this paper appeared as AEI-Brookings Joint Center for Regulatory Studies, Working Paper 6-21, September 2006.

11. McWilliam, Andrew, Randall Lutter and Clark Nardinelli, "Healthcare Impact of Personalized Medicine Using Genetic Testing: An Exploratory Analysis for Warfarin", *Personalized Medicine,* 5(3), 279-284, 2008. An earlier version appeared as AEI-Brookings Joint Center for Regulatory Studies, Working Paper 6-23, November 2006.

12. Randall Lutter and Tucker, Katherine, "Unacknowledged Health Benefits of Genetically Modified Food: Salmon and Heart Disease Deaths," *AgBioForum,* 5(2), 59-64, 2003, http://www.agbioforum.org/v5n2/v5n2a04-lutter.htm

13. Randall Lutter and Elisabeth Irwin, "Mercury in the Environment: A Volatile Problem", *Environment: Science and Policy for Sustainable Development,* Vol. 44, Number 9, 24-40, November 2002.

14. Randall Lutter and Jason F. Shogren, "Tradable Permit Tariffs: How Local Air Pollution Affects Carbon Emissions Permit Trading", *Land Economics*, Vol. 78, No. 2, 159-170, May 2002.

15. Randall Lutter and Elizabeth Mader, "Lead in Soil: Is Your Backyard Safer Than A Hazardous Waste Site?" *EM Magazine,* Air and Waste Management Association, 16-21, September 2001. An earlier version of this paper appeared as AEI-Brookings Joint Center for Regulatory Studies, Working Paper 00-03, June 2000.

16. Randall Lutter, "Getting the Lead Out Cheaply: Comments on EPA's Proposed Hazard Standards", *Environmental Science & Policy*, Vol. 4, 13-21, 2001. An earlier version of this paper appeared as AEI-Brookings Joint Center for Regulatory Studies, Working Paper 99-5, May 1999.

17. Randall Lutter, "Developing Countries' Greenhouse Emissions: Uncertainty and Implications for Participation in the Kyoto Agreement", *Energy Journal*, Vol. 21, No. 4. 93- 120, October 2000.

18. Randall Lutter, "Food Irradiation: The Forgotten Solution to Food-Borne Illness", *Science,* Vol. 286, 2275-2276, December 17, 1999.

19. Randall Lutter, John F. Morrall III, and W. Kip Viscusi, "The Cost-Per-Life-Saved Cutoff for Safety-Enhancing Regulations", *Economic Inquiry*, Vol. 37, No. 4., 599-608, October 1999.

20. Randall Lutter and Christopher Wolz, "UV-B Screening by Tropospheric Ozone: Implications for the National Ambient Air Quality Standard", *Environmental Science & Technology*, Vol. 31, 142a-146a, 1997.

21. Arthur Fraas and Randall Lutter, "Abandonment of Residential Housing and the Abatement of Lead-based Paint Hazards", *Journal of Policy Analysis and Management*, Vol. 15, 424-429, 1996.

22. Randall Lutter and John F. Morrall III, "Health-Health Analysis: A New Way To Evaluate Health and Safety Regulations", *Journal of Risk and Uncertainty*, Vol. 8, 43-66, 1994.

23. Isaac Ehrlich, Georges Gallais-Hamonno, Zhiqiang Liu, and Randall Lutter, "Productivity Growth and Firm Ownership: An Analytical and Empirical Investigation," *Journal of Political Economy,* Vol. 102, No. 5 1006–1038, October 1994.

24. John Logan and Randall Lutter, "Guaranteed Lowest Prices: Do They Facilitate Collusion?" *Economics Letters*, Vol. 31, 189-192, 1989.

Law Articles and Briefs

25. Arthur Fraas and Randall Lutter, "On the Economic Analysis of Regulations at Independent Regulatory Commissions: Would Greater Use of Economic Analysis Improve Regulatory Policy at Independent Regulatory Commissions? " 63 *Administrative Law Review*, (Special Edition) 213, (2011). An earlier version appeared as RFF Discussion Paper 11-16 and was presented at RFF's 2011 conference "Can Greater Use of Economic Analysis Improve Regulatory Policy at Independent Regulatory Agencies?"

26. Randall Lutter and Dallas Burtraw, "On the Gains From Integrating Markets For Permits To Emit Related Pollutants", *Fordham Environmental Law Journal*, Fall 2002. Also at http://aei.brookings.org/admin/pdffiles/phpP4.pdf. Presented at EPA NCEE Symposium on Cost-Effective Analysis for Multiple Benefits, September 2003.

27. Randall Lutter and Howard Gruenspect, "Assessing Benefits of Ground Level Ozone: What Role for Science in Setting National Ambient Air Quality Standards?" *Tulane Environmental Law Journal*, Vol. 15, Issue 1, 85-96, Winter 2001.

28. Randall Lutter, "Sovereignty, Federalism, and the Identification of Local Environmental Problems," *Chicago Journal of International Law*, Vol. 2, No. 2. 447-457, Fall 2001.

29. Brief Amici Curiae of AEI-Brookings Joint Center for Regulatory Studies, to the Supreme Court of the United States, *American Trucking Associations, Inc., et al., v. Carol M. Browner, Administrator of the Supreme Court et al.* AEI-Brookings Joint Center for Regulatory Studies, July 21, 2000.

Book Chapters

30. Randall Lutter, "Head in the Clouds Decision-Making: EPA's Air Quality Standards for Ozone", Chapter Two in Randall Lutter and Jason F. Shogren, editors, *Painting the White House Green: Rationalizing Environmental Policy Inside the Executive Office of the President*, 2004, RFF Press.

31. Randall Lutter and Elizabeth Mader, "Litigating Lead-Based Paint Hazards: Is It A Solution?" in *Regulation through Litigation,* Kip Viscusi, ed., AEI-Brookings Joint Center for Regulatory Studies, 2002.

Professional Papers and Reports

32. Randall Lutter and David Zorn, "On the Benefits and Costs of Public Access to Data Used to Support Federal Rulemaking", Mercatus Center, George Mason University, September 2016. http://mercatus.org/publication/benefits-and-costs-public-access-data-used-support-federal-policy-making

33. Dajun Lin, Randall Lutter and Christopher J. Ruhm, "Cognitive Performance and Labor Market Outcomes". NBER Working Paper No. 22470, July 2016. http://www.nber.org/papers/w22470. Presented at the World Bank, July 2016, and at the Annual Meetings of the Society for Risk Analysis, Washington D.C., 2015.

34. Abigail Colson, Roger Cooke and Randall Lutter, "How Does Breastfeeding Affect IQ? Applying the Classic Model of Structured Expert Judgment", Resources for the Future Discussion Paper 16-28 July 2016

35. Marc Hafstead and Randall Lutter, "What Is the Economic Value of Improved Labor Market Outcomes from Infant Nutrition? The Case of Breastfeeding in the United States". Resources for the Future Discussion Paper 16-29, July 2016. An earlier version was presented at presented at the annual meetings of the Society for Risk Analysis, Washington D.C., 2015.

36. Randall Lutter and David Zorn, "Improving Regulatory Cooperation Between the FDA and the EU", Report for the George Washington University Regulatory Studies Center,

April 2016. Published as part of a five paper series on US-EU Regulatory Cooperation: Lessons and Opportunities. https://regulatorystudies.columbian.gwu.edu/us-eu-regulatory-cooperation-lessons-and-opportunities . Referenced by Susan Dudley, "Transatlantic Regulatory Cooperation Needs Both Cooperation and Competition", Forbes, April 26, 2016. Presented at a conference on International Regulatory Cooperation in Practice, at the EU Delegation to the U.S., September 15th, 2016.

37. Art Fraas, Randall Lutter, Zachary Porter and Alexander Wallace, " The Energy Paradox and the Adoption of Energy Saving Technologies in the Trucking Industry", March, 2016, Working Paper, Mercatus Center, George Mason University. http://mercatus.org/publication/energy-paradox-and-adoption-energy-saving-technologies-trucking-industry. See also http://www.rff.org/blog/2016/testing-energy-paradoxes-competitive-industries. We presented this paper at the annual meetings of the Society of Benefit-Cost Analysis in March, 2016, and submitted it to the EPA and NHTSA as a public comment on a proposed rule regulating heavy-duty truck trailers.

38. Art Fraas, Randall Lutter, Susan Dudley, Ted Gayer, John Graham, Jason F. Shogren, W. Kip Viscusi, Letter: "Social cost of carbon: Domestic duty", *Science*, 05 Feb 2016: Vol. 351, Issue 6273, pp. 569 DOI: 10.1126/science.351.6273.569-b http://science.sciencemag.org/content/351/6273/569.2 . This letter was posted or cited at the Brookings Institution, https://www.brookings.edu/opinions/how-much-will-climate-change-rules-benefit-americans/, as well as the George Washington University Regulatory Studies Center, Resources for the Future and the University of Wyoming. A closely related letter to the National Academy of Sciences is available at http://www.rff.org/blog/2016/should-federal-regulatory-agencies-report-benefits-americans-mandated-reductions

39. Randall Lutter and David Zorn, "Reinforcing Reproducibility: What Role for the Federal Government?" *Regulation,* Winter 2015-16. 15-16, http://object.cato.org/sites/cato.org/files/serials/files/regulation/2015/12/regulation-v38n4-8_4.pdf#page=10

40. Randall Lutter, "Herding Genetically Engineered Animals to Market", Resources for the Future Blogpost, December 16th, 2015, http://www.rff.org/blog/2015/herding-genetically-engineered-animals-market. Also posted at the George Washington University Regulatory Studies Center: http://regulatorystudies.columbian.gwu.edu/herding-genetically-engineered-animals-market

41. Randall Lutter, "How Effective Are Federal Food Safety Regulations? The Case of Eggs and *Salmonella* Enteritidis", RFF Discussion Paper 15-24 | June 2015, http://www.rff.org/Publications/Pages/PublicationDetails.aspx?PublicationID=22570, Presented at RFF, December 2014 and the Society for Benefit-Cost Analysis, March 2015. Featured in http://www.rff.org/events/event/2015-10/real-outcomes-federal-environmental-regulations-lessons-performance-data

42. Art Fraas and Randall Lutter, "How Much Would EPA's Greenhouse Gas Rule Cool the Earth?" *Regulation,* Winter 2014-15, 4-5. http://object.cato.org/sites/cato.org/files/serials/files/regulation/2014/12/regulation-v37n4-9.pdf

43. Joe Aldy, Art Fraas and Randall Lutter, "OMB: Obscurity in Management and Budget", *Regulation,* Winter 2013-14, 5-6, OMB: Obscurity in Management and Budget?

44. Randall Lutter, Letter: "Waiving Concerns About Conflicts of Interest", *Science,* September 13th, 2013, 341:1173.

45. Art Fraas and Randall Lutter, "Review of *Using Marginal Damages in Air Pollution Policy: a Study of Air Pollution in the United States*, by Muller and Mendelsohn", *Journal of Economic Literature,* June 2013.

46. Nathan Richardson and Randall Lutter, "Making Sense of Ozone", RFF Policy Commentary, September 19, 2011.

47. Art Fraas and Randall Lutter, "Do Some NO_x Emissions Have Negative Environmental Damages? Evidence and Implications for Policy", *Environmental Science & Technology*, September 2011, Vol. 45, No.17, http://pubs.acs.org/doi/abs/10.1021/es202622z

48. Randall Lutter, "Food-Borne Illness Outbreak: Data Disclosure, Performance, and Recommendations for Reform", *Regulation Outlook,* American Enterprise Institute for Public Policy Research, No. 2, June 2011, www.aei.org/docLib/REG-2011-02-g.pdf

49. Arthur Fraas and Randall Lutter, "Can a Stew of Power Generation Regulations Clear the Air?" *Resources*, Resources for the Future, Fall 2010, No. 176, p. 30, http://www.rff.org/Publications/Resources/Pages/Can-a-Stew-of-Power-Generation-Regulations-Clear-the-Air-176.aspx

50. Randall Lutter, "Superior Salmon and More", *RFF Weekly Policy Commentary*, September 27th, 2010, http://www.rff.org/Publications/WPC/Pages/Superior-Salmon-and-More.aspx

51. Randall Lutter and William McConagha, "The FDA Responds", *Public Health Reports*, 2008 Jul-Aug; 123(4): 422–423, http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2430636/

52. Begosh, Allan, John Goldsmith, Ed Hass, Randall Lutter, Clark Nardinelli, John Vernon, "Black Box Warnings and Drug Safety: Examining the Determinants and Timing of FDA Warning Labels", *National Bureau of Economic Research Working Paper No. 12803*, December 2006, http://www.nber.org/papers/w12803

53. Randall Lutter, "Are There Any Cost-Effective Greenhouse Gas Controls That Politicians Would Like?" Americans for Equitable Climate Solutions. http://aecs-inc.org. 2003.

54. Randall Lutter and Troy Kravitz, "Do Regulations Requiring Light Trucks To Be More Fuel Efficient Make Economic Sense? An Evaluation of NHTSA's Proposed Standards", Regulatory Analysis 03-2, AEI-Brookings Joint Center for Regulatory Studies, at http://aei.brookings.org/admin/pdffiles/phpsa.pdf, February 2003.

55. Randall Lutter, "Rationalizing Air Pollution Regulation", *Regulation*, Volume 25, No. 1, 6-7, 2002.

56. Randall Lutter and Richard Belzer, "Authors and ACACCA Agree (Mostly)", Letter to the Editor of *Regulation,* Volume 25, No. 1, 2002.

57. Randall Lutter and Hoi Ying So, "Kyoto in Europe: Lessons for Policy Makers", European Policy Forum, at www.epfltd.org, July 2002.

58. Randall Lutter, "CAFE-The Numbers Behind the Story", AEI-Brookings Joint Center for Regulatory Studies, Policy Matters 02-13, http://www.aei-brookings.org/policy/page.php?id=84, March 2002.

59. Randall Lutter and Elizabeth Mader, "Flushing Federalism", AEI-Brookings Joint Center for Regulatory Studies, Policy Matters 01-27, November 2001.

60. Randall Lutter and Elizabeth Mader, Letter to the Editor about "Lead in Soil: Is Your Backyard Safer than a Hazardous Waste Site" *EM Magazine,* Air and Waste Management Association, 6, November 2001.

61. Randall Lutter, "Economic Analysis of Regulation in the U.S.: What Lessons for the European Commission?" Report to the Enterprise Directorate General, European Commission, For the Workshop on Impact Assessment in Member States, Brussels, June 26, 2001. http://ec.europa.eu/enterprise/policies/better-regulation/files/study_en.pdf

62. Randall Lutter, Elizabeth Mader, and Nathan Knuffman, "Regulating Mercury Emissions: What Do We Know About Costs and Benefits?" AEI-Brookings Joint Center for Regulatory Studies, Regulatory Analysis, http://www.aei.brookings.org March 2001.

63. Randall Lutter and Elizabeth Mader, "Health Risks From Mercury-Contaminated Fish: A Reassessment", AEI-Brookings Joint Center for Regulatory Studies, Related Publication, March 2001.

64. Robert W. Hahn, Randall Lutter, and W. Kip Viscusi, Do Federal Regulations Reduce Mortality? AEI-Brookings Joint Center for Regulatory Studies, Washington D.C.

www.aei.brookings.org, November 2000.

65. Randall Lutter and Richard B. Belzer, "EPA Pats Itself on The Back", *Regulation*, Volume 23, No. 3, 23-28, 2000.

66. Randall Lutter, "Will the Supreme Court Clear the Air?" (November 2000), American Enterprise Institute and AEI-Brookings Joint Center for Regulatory Studies, Policy Matters Working Paper No. 00-17. Available at SSRN: http://ssrn.com/abstract=259789

67. Nathan Knuffman and Randall Lutter, "Does Mercury in Fish Come from the Air?" AEI-Brookings Joint Center for Regulatory Studies, AEI-Brookings Joint Center for Regulatory Studies, Working Paper 00-06, September 2000.

68. Randall Lutter, "Valuing Children's Health: A Reassessment of the Benefits of Lower Lead Levels", AEI-Brookings Joint Center for Regulatory Studies, Working Paper 00-02, March 2000.

69. Randall Lutter, "Is EPA's Ozone Standard Feasible?" AEI-Brookings Joint Center for Regulatory Studies, Regulatory Analysis 99-6, 1999.

70. Randall Lutter, "An Analysis of the U.S. Department of Agriculture's Proposal to Allow Irradiation of Meat", AEI-Brookings Joint Center for Regulatory Studies, Regulatory Analysis 99-2, July 1999.

71. Randall Lutter, "The Role of Economic Analysis in Regulatory Reform", *Regulation*, Volume 22, No. 2, 38-46, 1999.
https://www.cato.org/pubs/regulation/regv22n2/econanalysis.pdf

72. Randall Lutter and Christopher DeMuth, "Wizards of Ozone", The Weekly Standard, 17-19, June 21, 1999. This article also appeared in On the Issues, American Enterprise Institute for Public Policy Research, www.aei.org, July 1999.

73. Randall Lutter, "An Analysis of the Use of EPA's Clean Air Benefit Estimates in OMB's Draft Report on the Costs and Benefits of Regulation", AEI-Brookings Joint Center for Regulatory Studies, Comment 98-2, October 1998.

Testimony

1. Randall Lutter, Perspectives on Retrospective Review and Analysis, Testimony for the House Committee on the Judiciary, Subcommittee on Courts, Commercial and Administrative Law, Clearing the Way for Jobs and Growth: Retrospective Review to Reduce Red Tape and Regulations, July 12, 2012.

2. Joe Aldy, Art Fraas and Randall Lutter, Public Interest Comment on The Office of

Management and Budget's Draft 2012 Report to Congress on the Benefits and Costs of Federal Regulations, June 2012

3. Randall Lutter, "Environmental Regulation, the Economy and Jobs", Testimony Before the Energy and Commerce Committee Subcommittee on Environment and the Economy, February 15, 2011. http://www.rff.org/RFF/Documents/RFF-CTst-Lutter-Feb152011.pdf

4. Randall Lutter, "Agencies' Regulatory Analyses Should Be Subject to Genuinely Independent Peer-Review," Testimony Before The Water Resources and Environment Subcommittee of the House Transportation and Infrastructure Committee, Hearing on Independent Peer-Review of Scientific, Technical and Economic Products that Support Agency Decision-Making, March 5, 2003. http://aei.brookings.org/publications/abstract.php?pid=315

5. Randall Lutter and Elisabeth Irwin, "FDA Should Allow Food Labeling Claims About Nutrient Content and Health", to the Food and Drug Administration, AEI-Brookings Joint Center for Regulatory Studies, Testimony 02-8, September 2002. http://aei.brookings.org/admin/pdffiles/phpUe.pdf

6. Randall Lutter, "Improving Regulatory Analysis at the Environmental Protection Agency", Testimony Before the House Committee on Small Business, Subcommittee on Regulatory Reform and Oversight, November 2001. www.aei.brookings.org/publications/testimony/testimony_01_05.pdf

7. Robert W. Hahn and Randall Lutter, "Elevating EPA to Cabinet Status", Testimony before the House Committee on Government Reform, Subcommittee on Energy Policy, Natural Resources, and Regulatory Affairs, September 2001. www.aei.brookings.org/publications/testimony/testimony_01_04.pdf

Professional Experience

Professor of Public Policy, Frank Batten School of Leadership and Public Policy, University of Virginia, August 2013 to the present. Served as Senior Lecturer from August 2013 to December 2015.

- Principal Investigator, The Economic Value of Improvements in Cognitive Performance Attributable to Breastfeeding, The Bill and Melinda Gates Foundation, April 2015. $721,000 plus $145,000 in supplementary funding.
- Teaches graduate courses in
  - benefit-cost analysis
  - environmental and natural resource policy
  - federal regulatory policy
  - data analysis and statistics

- Supervises applied public policy projects for candidates for Master of Public Policy.

Visiting Fellow, Resources for the Future, Washington, D.C, May 2010 to the present.

- Co-principal Investigator, with Richard Morgenstern and Art Fraas, Regulatory Performance Initiative, Sloan Foundation and Smith Richardson Foundation. $584,000. http://www.rff.org/research/collection/regulatory-performance-initiative-rff. In its 2015 annual report to Congress on the benefits and costs of federal regulation, the Office of Management and Budget cited this work and encouraged federal agencies to consider whether these analyses have identified any regulations that might be good candidates to retrospectively review.
- Organizer, moderator and speaker for February 19th, 2013 symposium on agricultural biotech and the environment. For video and selected slides, see http://www.rff.org/Events/Pages/Agricultural-Biotechnology-and-the-Environment.aspx.
- With Art Fraas, co-organizer, moderator and speaker for April 7th, 2011, conference "Can Greater Use of Economic Analysis Improve Regulatory Policy at Independent Regulatory Commissions?" http://www.rff.org/Events/Pages/Can-Greater-Use-of-Economic-Analysis-Improve-Regulatory-Policy-at-Independent-Regulatory-Agencies.aspx , supported by the Ewing Marion Kauffman Foundation.

Independent consultant and economist, Bethesda, MD, January 2010 to the present.

- Conducts analysis of regulatory issues for corporate and nonprofit organizations.
- Trains government officials for the U.S. and other countries.
- Chaired CropLife America Science Forums on judging the quality of scientific work (May 2011) and on judging weight of evidence approaches (May 2012).

Senior Economist, Office of Information and Regulatory Affairs, Office of Management and Budget. September 2009 to January 2010. Advised the OIRA Administrator, conducted economic analysis in support of regulatory review.

Deputy Commissioner for Policy, FDA, January 2007 to August 2009. Responsible for coordinating the development and issuance of FDA regulations and guidance documents. Directed development of strategic policy and planning, focusing on the performance. Played a lead role articulating FDA's concerns about the risks of importation of unapproved pharmaceutical products. Co-chaired the FDA's Counterfeit Drug Task Force and FDA's Nanotechnology Task Force.

- Responsible for supervision of the Offices of Policy and Planning, Counterterrorism and Emerging Threats, and Advisory Committee Oversight and Management. Supervised nearly 90 staff including lawyers, medical officers, pharmacists, economists, statisticians and operations research analysts involved in the development of science-based regulatory policies and performance-based planning.
- Led development of new policies addressing consumer safety, covering safety of food from animal clones, genetically engineered animals, risk of BSE from animal feed, and

risk of salmonella from shell eggs.

- Oversaw policy analysis for new legislative proposals, including user fee programs for drugs and medical devices.
- Initiated and engineered a new effort to anticipate and prevent economically-motivated adulteration of foods and drugs, by applying an economics paradigm to such adulteration. http://www.fda.gov/NewsEvents/MeetingsConferencesWorkshops/ucm163619.htm
- Led development of new policies on advisory committees including more stringent standards for granting waivers of conflicts of interest, more transparency in disclosure of such waivers, and more timely posting of briefing materials to the public http://www.fda.gov/oc/advisory/aclawsregs.html
    - Designed and oversaw studies showing greater expertise is provided by advisory committee members who need waivers for conflicts of interest http://www.fda.gov/oc/advisory/ERGCOIreport.pdf, and that there is no correlation between having such conflicts when duly disclosed and voting patterns http://www.fda.gov/oc/advisory/conflictofinterest/ERGCOIAndVoting011509.pdf
- Promoted preparedness by authorizing the emergency use of doxycycline hyclate tablet emergency kits for the post-exposure prophylaxis of anthrax for eligible US Postal Service participants and their household members.
- Testified before Congress, including on drug importation, http://www.fda.gov/ola/2007/importdrugs30707.html and federal preemption of state law http://oversight.house.gov/documents/20080514142253.pdf

Associate Commissioner for Policy and Planning, Food and Drug Administration. Led and directed policy and planning staff with expertise in law, microbiology, pharmacy, economics, statistics and operations research. April 2005 to January 2007.

- Led effort to implement pedigree requirements to fight counterfeit drugs. http://www.fda.gov/oc/initiatives/counterfeit/report6_06.html

- Designed and led analysis of confusing foreign drug names, resulting in first-of-a-kind public health advisory that consumers filling prescriptions abroad may get the wrong active ingredient. http://www.fda.gov/oc/opacom/reports/confusingnames.html

- Helped design studies to detect and assess risks to consumers of imported unapproved drug products found at international mail facilities and articulated the results of such studies to the press. http://www.fda.gov/bbs/topics/NEWS/2005/NEW01277.html

- Warned governors and mayors about the risks associated with programs to import unapproved foreign drugs.

Chief Economist, Office of Planning, Office of Policy and Planning, Food and Drug Administration. Responsible for ensuring that all FDA proposed and final regulations, prior to publication in the Federal Register, comply with Executive Order 12866, all relevant directives

and requirements from the Office of Management and Budget (including the OMB guidance on economic analysis), the Regulatory Flexibility Act and the Unfunded Mandates Reform Act. Ensured analysis supporting such policy-related regulatory decisions conforms to these administrative and legal requirements. March 2003 to April 2005.

- Won FDA Commissioner's Award for Excellence, 2004.

- Conducted and directed economic analyses of FDA regulatory issues and supervised and directed the work of the economics staff to ensure completion of economic analyses was timely and could inform leadership before relevant risk management decisions.

- Directed analysis of the economic effects of the legalization of commercial drug importation for the Department of Health and Human Services Task Force on Drug Importation. http://archive.hhs.gov/importtaskforce/Report1220.pdf. Negotiated $400,000 in funding for this report from the Department of Commerce and the Assistant Secretary of Planning and Evaluation of the Department of Health and Human Services.

- Led FDA technical team advising the Department of Commerce on study of the effects of foreign price controls on pharmaceutical research and development for a report to Congress.

- Co-chaired interagency group advising OMB about its guidance to regulatory agencies on the conduct of economic analysis.

Resident Scholar at the American Enterprise Institute and *Fellow* with the AEI-Brookings Joint Center for Regulatory Studies. Researched benefits and costs of ongoing health, safety and environmental regulatory initiatives, and methods of evaluating regulatory effects. Areas of specialization ranged from food safety and labeling, to air pollution, global warming and toxic substances, and regulatory reform. August 1998 to March 2003.

Senior Economist for the environment and regulation, the President's Council of Economic Advisers, Executive Office of the President. July 1997 - August 1998.

- Analyzed economic effects of limiting greenhouse gas emissions and different arrangements for international trade in emission permits. Helped draft key Congressional testimony on the Kyoto Protocol. Initiated proposals for developing countries to accept indexed greenhouse gas emissions targets. Presented results to top officials from the White House and Cabinet agencies.
- Analyzed electricity restructuring proposals, especially environmental policies to limit air pollutant emissions. Reviewed and critiqued key environmental regulations. Developed recommendations for members of the Council and other top White House officials.
- Analyzed major air pollution regulations and persuaded decision-makers to adopt more efficient regulatory alternatives.
- Chaired interagency group on methods of analyzing costs and benefits of federal regulations.
- Authored parts of the *Economic Report of the President 1998* and wrote several weekly

economic briefings for the President.

Staff Economist for the Office of Information and Regulatory Affairs, Office of Management and Budget, Executive Office of the President. Summarized and justified alternative policy recommendations to White House and OMB decision-makers, giving special emphasis to market-based alternatives to traditional command and control regulations. Helped write guidance to Federal agencies on how to conduct benefit-cost analysis. Completed executive training for Senior Executive Service. September 1991 - July 1997.

- Earned OMB Exceptional Achievement Award 1996, OMB Professional Achievement Awards, 1993, 1995.

- Staffed President Clinton's Health Care Reform Task Force and provided briefings to the Cabinet and the President about the effects of price controls.

- Drafted sections of OMB's 1996 best practices document on economic analysis of federal regulations under Executive Order 12866. http://www.whitehouse.gov/omb/inforeg_riaguide

- Served as lead OMB analyst for major regulations and policy initiatives including
  - EPA's 1997 air quality standards for ozone and particulate matter
  - EPA's drinking water standards
  - USDA's EQIP and Conservation Reserve Program
  - FDA's food labeling regulations
  - FDA's tobacco regulation
  - EPA's control of toxic substances (PCBs, lead, and pesticides).

Adjunct Professor, Department of Economics, American University. Taught economics of health care and health policy. Spring,1995.

Assistant Professor of Managerial Economics and Policy, School of Management, State University of New York at Buffalo. Advised and instructed doctoral candidates, MBA candidates, and mid-career managers. Developed courses in international economics for MBA students and seminars for mid-level managers. Taught managerial economics, applied macro-economics and corporate finance. 1985 – 1991.

- Best Instructor of the Year, School of Management, 1986-1987.

Associate Director for the USAID-funded Institute for the Study of Free Enterprise Systems at the State University of New York at Buffalo. Planned, organized scholarly conferences, wrote periodic performance reports, prepared annual budgets, supervised research assistants. 1987 – 1991.

Development Consultant, U.S. Embassy, Yaounde, Cameroon. Identified locally initiated community development projects in the Republic of Equatorial Guinea, and evaluated their

suitability to receive funding from Self-Help program. 1980.

Staff, Peace Corps, Cameroon. Responsible for support and administration of cooperative assistance program. Assessed feasibility and desirability of establishing Peace Corps program in the Republic of Equatorial Guinea. 1980.

Management Advisor, cocoa marketing cooperative, Peace Corps, Cameroon. As Peace Corps volunteer, designed and implemented systems for cocoa marketing, cash and produce control. Performed and supervised internal audits, assisted audits by the supervisory ministry. Provided training to cooperative staff and officials. 1978-1980.

Additional Activities

Selected Presentations

Randall Lutter, "Benefit-Cost Analysis at the Office of Information and Regulatory Affairs: Perspectives of a Practitioner", Workshop at the Annual Meetings of the Society for Benefit-Cost Analysis. March 2016. Washington D.C.

Randall Lutter, "The Use of Science at FDA", January 2016, Searle Civil Justice Institute Conference, "Regulatory Daubert: An Examination of the Issues", George Mason University Law School, Arlington VA.

Randall Lutter, "Genetically Engineered Organisms: Perspectives of a Former Regulator", November 2015, invited presentation at "FDA Premarket Approval and the Future of Innovation, Institute for Humane Studies & Mercatus Center, George Mason University, New Orleans, November 20th, 2015.

Art Fraas and Randall Lutter, "PM Benefits Estimates, Sans Uncertainty", presented at the annual meetings of the Society for Benefit Cost Analysis, February 2013, Washington D.C.

Randall Lutter, "Regulations and Jobs, An Economist's Views", presented at the annual meetings of the Administrative Law Section of the American Bar Association, November 2010, Washington D.C.

Randall Lutter, "Improving Food Safety: How Best to Quantify Public Health Agencies' Performance Responding to Outbreaks of Foodborne Illness?" American Society of Health Economists, Cornell University, June 2010.

Randall Lutter, "Regulatory Oversight and Productivity in Pharmaceutical Innovation: A Perspective from FDA", American Society of Health Economists, Duke University, June 2008.

Randall Lutter, "New Perspectives on Pharmaceutical Innovation", American Society of

Health Economists, Duke University, June 2008.

Randall Lutter, "The Wrongful Segregation of Risk Assessment and Benefit-Cost Analysis", Society for Risk Analysis, New Orleans, December 2002.

Randall Lutter, "Improving RIA Quality: Insights from the U.S." APEC-OECD Co-operative Initiative on Regulatory Reform. Merida, Mexico, April 2002.

Randall Lutter, "CAFE After 9/11", Society of Automotive Analysts, Detroit, January 8, 2002.

Arthur Fraas and Randall Lutter, "Regulatory Analysis: Past Experience with EPA Analysis and New Challenges", presented at the annual meeting of the *Southern Economic Association*, Washington D.C., 1996.

Randall Lutter, "Distributional Effects of Selected Environmental Regulations", presented at the annual meeting of the *Southern Economic Association*, Washington D.C., November 1996.

Randall Lutter, "Allocative Inefficiencies of State Owned Enterprises in Imperfectly Competitive Markets: Evidence from Air Transport," presented at the *American Economics Association* meetings, January 1992.

Selected General Interest Articles and Appearances

Randall Lutter, "What Would Madison Think? New federal regulations in the pipeline prior to November", Batten Reports, Fall 2016. Frank Batten School of Leadership and Public Policy, University of Virginia. http://batten.virginia.edu/school/news/federal-regulatory-policy-2016-would-madison-approve

Susan E. Dudley, Art Fraas, Ted Gayer, John Graham, Randall Lutter, Jason F. Shogren, W. Kip Viscusi, "How Much Will Climate Change Rules Benefit Americans?' *Forbes, / Opinion*, February 9, 2016. http://www.forbes.com/sites/susandudley/2016/02/09/how-much-will-climate-change-rules-benefit-americans/#99f493c59ec7

Art Fraas and Randall Lutter, "Rulemaking Negligence at EPA", *Washington Times,* October 2013. http://www.washingtontimes.com/news/2013/oct/6/fraas-and-lutter-rule-making-negligence-at-the-epa/

Joe Aldy, Art Fraas and Randall Lutter, "Financial Regulation Sans Analysis", *Politico,* June 21, 2012, www.politico.com/news/stories/0612/77644.html

Randall Lutter, "Building Carbon Emissions Markets", Panel Discussion on Policy Options for Power Plant Multi-Emission Control Legislation, Americans for Equitable Climate Change Solutions, December 10th, 2002.

Randall Lutter, "'Gone Fishin' For Nutrition' Misses an Important Point", Letter to the Health Editor, *Washington Post*, November 26, 2002.

Randall Lutter, "FDA Squashes Fish Tales", *Washington Times*, http://www.washtimes.com/commentary/20021029-84262998.htm, October 29, 2002.

Randall Lutter, "What Grade for Government Regulations?" Administrative Law Section of the American Bar Association, Washington D.C., October 2002.

Randall Lutter, "Litigating Lead Hazards: Is it a Solution?" at conference on "Finding Effective Solutions for Lead Base Paint Hazards", Center for Legal Policy Forum of the Manhattan Institute for Policy Research, Providence, R.I., June 19th, 2002.

Randall Lutter, "Clean Air and Polluted Science", *Washington Times,* March 25, 2002, also *On the Issues,* American Enterprise Institute, and AEI-Brookings Joint Center for Regulatory Studies, *Policy Matters 02-12,* March 2002.

Randall Lutter, "Bountiful Incentives", Tech Central Station At http://www.techcentralstation.com, March 2002.

Randall Lutter, "Rationalizing Air Pollution Regulation", Presentation at conference *Regulating Air Pollutants from Power Plants: What is Sensible?* by the AEI-Brookings Joint Center for Regulatory Studies. February 19th, 2002.

Randall Lutter, "How to Get Clean Air At Less Cost", *Washington Times*, February 5th 2002, also *On the Issues*, American Enterprise Institute, and AEI-Brookings Joint Center for Regulatory Studies, *Policy Matters 02-6,* February 2002.

Randall Lutter, "Put a Price on His Head", Tech Central Station At http://www.techcentralstation.com/DefenseExtra.asp?id=160, January 2002, also *On the Issues*, American Enterprise Institute

Randall Lutter, Radio interview on global warming with The Voice of America, December 18, 2001.

Randall Lutter, "Refining Repairs to Regulatory Reform", Presentation to the Weidenbaum Center Forum "Executive Regulatory Review: Surveying the Record, Making it Work", National Press Club, Washington, D.C., December 17, 2001.

Randall Lutter, "Litigating Lead Hazards: Is it a Solution?" at conference on "Finding

Effective Solutions for Lead Base Paint Hazards", Center for Legal Policy Forum of the Manhattan Institute for Policy Research, Baltimore, December 13, 2001.

Randall Lutter, "Chill Out on Warming" in German, *Financial Times Deutschland*, April 10, 2001.

Randall Lutter, "Ignoring All Costs Won't Clean Our Air", *Los Angeles Times*, March 5, 2001.

Randall Lutter, The Benefits and Costs of Regulating Mercury Emissions From Utilities, Presentation at Resources for the Future, January 17, 2001.

Randall Lutter, Heather Ross and John Fialka, Videotaped panel discussion for the *National Economists Club Education Foundation*, "Air Quality Costs and Benefits: In Economics and the Law", January 10, 2001.

Randall Lutter, Interview on the Supreme Court's review of the Environmental Protection Agency's 1997 air quality standards, *National Public Radio*, Salt Lake City, November 14, 2000.

Randall Lutter, "Costs Swamp Benefits", *Los Angeles Times*, November 7, 2000.

Randall Lutter, "Clouds on the Open Sky Horizon", *Washington Times*, A2, June 12, 2000.

Randall Lutter, Interview on food irradiation for *Newsnight* Maryland Public Television, May 30, 2000.

Randall Lutter, "Irradiation: Almost Perfect", *Washington Post,* April 4, 2000.

Education

Degrees:

Ph.D. Economics, Cornell University, 1986
M.A. Economics, Cornell University, 1983
B.A. Economics, University of California, Berkeley, 1977: Phi Beta Kappa

Languages: Fluent French, conversational Spanish

Service

Lectures / Presentations / Seminars given at: American Bar Association, American Economics Association, American Enterprise Institute, Americans for Equitable Climate Solutions, American University, American Water Works Association, Boston University, Brookings,

College of William and Mary, Consumer Financial Protection Bureau, Cornell University, Duke University, Eastern Finance Association, European Association for Research in Industrial Economics, European Commission (Enterprise DG), Food and Drug Administration (CFSAN), George Washington University, Harvard University (Kennedy School), Michigan State University, National Economists Club, National Economists Club Education Foundation, Resources for the Future, Society for Benefit-Cost Analysis, Society of Government Economists, Society for Risk Analysis, Southern Economics Association, State University of New York at Buffalo, University of Delaware, University of Maryland, University of Maryland Baltimore County, University of Minnesota, University of Virginia (Law School), University of Wyoming, U.S. Department of Agriculture (Economic Research Service), Western Economics Association, the World Bank.

Referee for: American Enterprise Institute, AEI-Brookings Joint Center for Regulatory Studies, *American Economic Review, American Journal of Public Health,* Brookings, Congressional Budget Office, *Economic Inquiry, Energy Journal, International Journal of Industrial Organization, Journal of Air and Waste Management, Journal of Benefit-Cost Analysis, Journal of Environmental Economics and Management, Journal of Health Economics, Journal of Industrial Economics, Journal of Risk and Uncertainty, Mercatus Center,* National Research Council, NBER, Office of Management and Budget, *Operations Research, Management Science*, Prentice-Hall, *Regulation and Governance*, Smith-Richardson Foundation, the World Bank.

Leadership in Professional Societies: Society for Benefit-Cost Analysis, Assistant Treasurer 2015, Treasurer 2016

Personal Interests: Whitewater kayaking (Over-the-Falls Race, Ohiopyle, PA, 2007-2009, 2012, and 2015, www.fallsrace.com; Cheat River Race 2008, 2010-15 http://www.cheatriverrace.com/ and Potomac Downriver Race 2009 and 2010, and 2015, 2nd place, Potomac Little Falls Race, 2016); event chair for the 2010 USA Canoe Kayak National Slalom Championships at Mirant's Dickerson Station; 2011-2014, secretary of Potomac Whitewater Racing Center, http://bce-racing.com/blog/ 2010-2013.

BEFORE THE

SURFACE TRANSPORTATION BOARD

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

RECIPROCAL SWITCHING

VERIFIED STATEMENT

OF

PROFESSOR MICHAŁ GRAJEK

October 20, 2016

Access Regulation and Investment Incentives in the U.S. Railroad Industry

by Professor Michał Grajek

I. Background Information

My name is Michał Grajek. Since 2007, I have been an associate professor of economics at the European School of Management and Technology in Berlin, Germany, where I also currently serve as Director of Research. Prior to joining the European School of Management and Technology as an assistant professor in 2007, I worked as a research fellow at the Social Science Research Center Berlin (Wissenschaftszentrum Berlin) and the Humboldt University of Berlin. Since 2007, I have acted as a research consultant for *E.CA Economics* in Berlin and, since 2012, as a non-resident fellow for Bruegel, a Brussels-based policy think tank. In multiple projects, I have advised clients and policy makers on competition policy issues, using microeconomic theory and applied econometrics.

My research interests lie in the areas of applied econometrics, industrial organization, and competition policy, and I have published in leading journals such as the *Journal of Law and Economics*, the *International Journal of Industrial Organization*, and the *Journal of International Business Studies*. Most relevant for the purposes of this report, I have studied, among other topics, investment and regulatory issues in network industries. Concretely, I have investigated the impact of the EU's access regulation in various network industries (e.g., telecommunication, broadband internet) on infrastructure investment by industry incumbents and new entrants.

My curriculum vitae is attached to this report as Attachment A.

II. Purpose and Outline of this Report

Answering to a petition filed by the National Industrial Transportation League, the Surface Transportation Board (the Board) has proposed new regulations governing competitive/reciprocal switching rules in the railroad industry (Surface Transportation Board, 2016, Docket No. EP 711 (Sub-No. 1), served July 27). I have been asked by Norfolk Southern Railway Company (NS) to assess the potential economic effects of these new regulations governing reciprocal switching, with particular emphasis on the investment incentives for the freight railroads in the U.S.

There is a relative paucity of theoretical studies on the issue of access regulation and investment incentives, as applied to the railroad industry. There is also insufficient historical data that could be meaningfully used to empirically examine the impact of the revised reciprocal switching regulations on the infrastructure investment in the U.S. railroad industry. This lack of historical precedent makes direct application of econometric techniques impossible for the purposes of this report.

However, my empirical research has studied at great depth the impact of the EU's access regulation on infrastructure investment in the telecommunications industry. The rules proposed by the Board are functionally similar to those imposed in the industries that I have studied. In particular, the railroad industry has similar incentives of firms to invest in infrastructure with other network industries, such as the telecommunications industry. This enables me to rely upon the existing economics literature on investment in the network industries to draw conclusions regarding the expected effects of revised reciprocal switching regulations in the U.S. railroad industry.

This report presents my assessment of these investment incentives based on economic principles, the relevant economics literature, as well as my own theoretical and empirical research that I have conducted on this issue. My report is structured as follows: **Section III** provides an executive summary of the most important points in this report; **Section IV** gives an overview of relevant economics theories to the case at issue, in particular, it describes the economic mechanisms explaining the potential impact of reciprocal switching on railroad infrastructure investment; **Section V** reports the empirical findings of how access regulations changed incentives to invest in the EU's telecommunications markets; **Section VI** concludes with lessons for the railroad industry.

III. Executive Summary

My analysis of the impact of the revised reciprocal switching regulations on investment incentives in the U.S. railroad industry is summarized as follows:

- Economic theory suggests that the Board's proposed regulation will reduce future rail investments, given the specific context of the case at issue. Some arguments advanced by economists concerning ways that access can promote investment do not apply to the U.S. railroad industry. In particular, although entry of new firms was found to be a driving counterbalancing force for investment in the EU telecoms industry, access regulation is not likely to result in the entry of new firms into the U.S. railroad industry. Instead, incumbent railroads will be discouraged from investing in future infrastructure due to both the asymmetric risk of seeing traffic poached (while bearing the full cost of the investments if the desired traffic does not materialize) and the reduction in the expected value of future investments.

- My empirical research in the telecommunications industry also predicts a material reduction in long-term investment should the Board relax its current standards for forced reciprocal switching. In the EU, decisions by the national telecommunications regulators implementing easier access conditions over time resulted in a substantial loss of investment in the telecoms infrastructure, as shown by Grajek and Röller (2012).

- Our published empirical research revealed the overall effect of access regulations in the EU's telecommunications industry was a net loss of €16.4 billion ($15 billion) in private investments over a decade, which corresponds to net loss over 20% of the total industry infrastructure stock. That net loss would rise to over €40 billion ($36.5 billion) without the counterbalancing investments from new market entrants to the industry—investments that are unlikely to occur in the U.S. rail industry.

- The full scope of the long-term tradeoff in lost investment will depend critically on the scope of the new rules and the level of access compensation. Given the anticipated breadth of their applications, the proposed revised reciprocal switching regulations will put a significant strain on the future investment in U.S. rail infrastructure and the ability of the industry to meet the transportation needs of the U.S. economy in the coming decades, especially if those regulations are coupled with access conditions that do not adequately compensate the infrastructure owners – for instance, by ignoring the opportunity cost in the Efficient Component Pricing Rule (ECPR).

IV. Economic Literature on Access Regulation in Network Industries

Network industries are typically characterized by a physical infrastructure connecting locations where customers are present (i.e., a network). Examples include railroads, telecommunications, and postal services. Where the marketplace does not support duplicate infrastructure, competitive bottlenecks may emerge. Regulatory approaches aimed at addressing such bottlenecks share some important similarities across network industries, which is why some countries, e.g., Germany, have established regulatory agencies that are in charge of multiple network industries.[1]

The economics literature on the effects of access regulation on investment in network industries is prolific, albeit not as applied to the railroad industry. The general literature focuses to a large degree on the telecommunications industry, which provides rich historical data for

[1] The German Bundesnetzagentur's mandate is to promote effective competition in the regulated areas and ensure non-discriminatory access to networks in Electricity, Gas, Telecommunications, Post and Railway industries (http://www.bundesnetzagentur.de/cln_1431/EN/General/Bundesnetzagentur/Bundesnetzagentur-node.html, accessed on September 21, 2016).

studying these effects, for example due to the EU's eCommunications framework, a comprehensive system of access regulations gradually introduced in late 1990's and early 2000's (see for instance Briglauer, Cambini and Grajek, 2015).[2]

Broadly speaking, the economics literature stresses two important ways in which the regulated industry will be affected by access regulation. First, the mandated access will have an immediate effect on consumer welfare (through prices) by virtue of increased competition between incumbent and entrants. Second, the mandated access will have a longer-term impact, because it changes the incentives of both the incumbent firm and the entrant(s) to invest in the maintenance, upkeep, upgrading, and extension of the network. Thus, a more stringent access regulation[3] may benefit customers through lower retail prices in the short term, but it also runs a risk of undermining the incentives to invest in the network infrastructure (see for instance Laffont and Tirole, 2000; Newbery, 2002).

Academics have come up with various theories to explain the mechanisms of how access regulation affects investment incentives in network industries.[4] However, the applicability of some of these theories is highly context-specific and no theoretical consensus has emerged.

On the one hand, economic theories suggest that access regulation will deter investment and harm the industry long term. Access regulation lowers the expected revenues realized by forcing the incumbent to sell its services at regulated (not market) prices. Thus, under the net present value NPV calculation an infrastructure investment project is less likely to be profitable when access is regulated (Pindyck 2007). This fundamental effect of access regulation discourages long-term investment by any incumbent in any industry, including railroads subject to reciprocal switching regulations.

Moreover, network infrastructure typically involves long-term investments. In the case of rail networks, the average life of roads amounts to some 30 years (see for instance NS figures reported in Baranowski, 2014, Docket No. EP 722, September 5). Because the future is uncertain, the revenue streams realized from infrastructure projects are also uncertain. Under access regulation, the incumbent firm bears the entire investment risk, while entrants enjoy a risk-free option to rent the infrastructure at the mandated access charge when the investment

[2] In the context of the telecommunications industry, the incumbent company is typically the legacy network owner, which, prior to liberalization, was a monopolist offering telephone services. The experience with access regulation in telecommunications shows that the most important competitive bottleneck is the "last mile", i.e., the part of infrastructure connecting individual households to the local switch. In many countries including the U.S. and the EU member states, this part of the infrastructure (also known as "local loops"), has been subject to access regulation (known as "local loop unbundling"). Under local loop unbundling, entrants into a given local telecommunications market could rent at the regulated fee the incumbent firm's local loops in order to sell telephone and internet services to households previously served by the incumbent firm.

[3] A more stringent access regulation is implemented through lower access charges and/or easier terms of access.

[4] A detailed description of these conflicting academic theories can by found in my published work, attached to this report as Appendix B.

turns out to generate revenues (see, e.g., Hausman 1997, Jorde, Sidak and Teece 2000, Pindyck 2007). In essence, this means that when the times are good, the profit from the investment is shared with the entrant, which rents the infrastructure at the regulated access price. When the times are bad, the losses need to be borne by the incumbent alone. Because the access regulation typically does not fully compensate the incumbent firm for taking this asymmetric risk, it reduces the incentives to invest in the infrastructure.

On the other hand, some scholars have hypothesized that that access regulation may have a positive impact on incumbent firm's investment when the entrant is more efficient or innovative than the incumbent (see for instance Sibley and Weisman 1998, Foros, 2004, Kotakorpi 2006, Ray and Tirole 2007). Applying this theory to the context at issue, it is unlikely that the reciprocal switching regulation will induce the increased infrastructure investment as predicted by the entrant's efficiency argument, because the potential entrants, i.e., other Class I railroads, have been present in the U.S. railroad industry long enough to enter any profitable reciprocal switching agreements on a voluntary basis.

Access regulation can also enable a race between the incumbent firm and the entrants to invest in network infrastructure (see for instance Gans and Williams 1999, Gans 2001, Guthrie 2006). This competition will positively affect investment if the incumbent and the entrants compete to be the first to provide new infrastructure thereby increasing their respective revenues. Such a race to preempt the rival's investment efforts is particularly relevant for upgrading the existing infrastructure.[5]

As another illustration, investment might increase if access regulation facilitates entry of new firms. For instance, Grajek and Röller (2012) report that the average number of entrants in the telecoms market in the EU member states increased from around two to around three over 1997-2006, a period in which eCommunication framework was gradually implemented by the national regulatory agencies. But the theoretical effect of access regulation on the entrants' investment in network industries is ambiguous. On the one hand, the regulation reduces barriers to entry thereby attracting new firms, which may invest. On the other hand, it reduces the incentives to invest, because the entrants can rent the infrastructure at the regulated prices (see for instance Hellwig, 2008).

To sum up, economists have proposed various theories aimed at explaining the mechanisms by which access regulation in network industries can affect incentives to investment in infrastructure. The balance between investment promoting and investment deterring mechanisms change if we include *context-specificity* of case at issue: some theoretical mechanisms that predict mandated access to promote infrastructure investment in the network industries, in particular telecommunications industry, do not apply to the reciprocal switching in the U.S. railroad industry. In particular, although entry of new firms was found to be a driving

[5] For instance, the eCommunications framework facilitated a race for broadband internet provision using improved technology on the existing local loops.

counterbalancing force for investment in the EU telecoms industry, access regulation is not likely to result in the entry of new firms into the U.S. railroad industry. Instead, incumbent railroads will be discouraged from investing in future infrastructure due to both the asymmetric risk of seeing traffic poached (while bearing the full cost of the investments if the desired traffic does not materialize) and the reduction in the expected value of future investments.

V. Estimating the Effect of Access Regulation on Investment in the European Telecoms

As discussed above, economists have proposed various theoretical mechanisms that explain how access regulation in network industries can affect incentives to investment in infrastructure. Still, because these theories yield conflicting predictions, empirical evidence is helpful in assessing which of the alleged mechanisms dominate.

One recent empirical study that assesses the impact of access regulation on investment in network infrastructure, is my coauthored work with Prof. Lars-Hendrik Röller, which was published by the *Journal of Law and Economics* in 2012. In this study, we use dataset covering 70 fixed-line (wired) telecommunications companies in 20 EU member states over 10 years to identify the impact of the Paneuroepan eCommunications regulatory framework,[6] which facilitated mandated access to the legacy telecoms networks (known as "local loop unbundling") on investment behavior by telecom providers (see Attachment B).

In our paper, we assess the stringency of local loop unbundling regulation. We do so by compiling information on five regulatory measures related to mandated access to incumbent firm's infrastructure: the existence of accounting separation obligation, regulation regarding full unbundling, line sharing, bitstream access and subloop unbundling.[7] As the stringency of regulation increases with additional measures added to the national regulators' policy portfolio, so does the ease with which entrants can choose the most desirable form of access. Measured this way, the stringency of local loop unbundling increased in the EU member states over the period we studied.

---

[6] Legal source for the framework include: European Commission, Notice on the application of competition rules to access agreements in the elecommunications sector: Framework, Relevant Markets and Principles, 98/C 265/02; Regulation (EC) No 2887/2000 of the European Parliament and of the Council of 18 December 2000 on unbundled access to the local loop; Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services.

[7] The first of these five measures allows national regulators to check whether incumbent firm's affiliate receives preferential terms of access to the incumbent's infrastructure (i.e. the local loops). The remaining four measures offer various ways the entrants can access the incumbent's infrastructure in order to offer retail broadband service to consumers, each associated with a different level of entrant's capital investment. For instance, bitstream access requires much less capital investment than full unbundling, but also substantially restricts the entrant's choice of technology and, as a consequence, the quality of its service.

We then link the stringency of access regulation with investment by building and estimating an econometric model, which features a separate equation for incumbent investment and entrants' investment. Thus, our model accommodates different investment incentives for incumbents and entrants, and allows for possible competitive responses of entrants' investments to incumbents' investments, and the other way around.

There are three main results of our study. First, higher stringency of regulation – and therefore easier mandated access – discouraged investment by incumbent firms. This is in line with the fundamental economic principles that access regulation lowers the expected value of investments and exposes the incumbent firm to asymmetric risk, which deters investment.

Second, the easier mandated access discouraged investment by individual entrants already in the marketplace, but because at the same time new entrants came to the market, the total investment by all entrants together increased due to the easier mandated access. This observation is in line with the theoretical argument about how investment might increase with the entry of new firms. In essence, the ease of access allows more new entrants in the telecommunications industry; hence there are more firms that can invest in the infrastructure.

Third, the sharp decrease in investment by incumbent firms overwhelmed the more modest increases in investment from market entrants. We estimated the overall effect of access regulation on total industry investment in Europe to be a loss of €16.4 billion over the past 10 years. This number is the expected long-term investment loss from our econometric model triggered by the increased stringency of access regulation, as observed over 1997-2006. Thus, the loss investment on the side of the incumbent firms was not fully compensated by the entrants' investments, which lead to a big investment shortfall in total.

What makes the findings of this empirical research relevant to the case at issue? As the Board contemplates relaxing its standards for forced reciprocal switching regulation, it needs to recognize that there will be a tradeoff between the possible short-term impact on pricing and the long-term impact on rail infrastructure investment. The Board should heed the lessons learned in other network industries. Thus, my published empirical results revealing a massive reduction in long-term investments that followed mandated access regimes on local loop unbundling are instructive for the Board's proposal.

VI. Lessons for the Railroad Industry

Forced reciprocal switching and forced local loop unbundling are functionally similar in that they both mandate shared access to parts of the bottleneck infrastructure by the incumbent firm and the entrant. In both industries, the entrant uses the incumbent firm's infrastructure to offer retail services to the customers. In the context of the reciprocal switching, which is a particular case of access regulation applied in the U.S. railroad industry, the incumbent company

is the *Class I* railroad that solely owns the tracks—and other necessary infrastructure—to provide freight services to some shippers; the entrant onto the railroad track at issue is another railroad that could offer a service to those shippers under a reciprocal switching arrangement with the incumbent railroad.

One important difference, however, may be the pool of potential entrants. Under the proposed reciprocal switching, each entrant into a given local market is an incumbent in another local market. In the telecommunications industry for instance, there is typically one incumbent firm (i.e., the previous monopolist) and a number of entrants, which do not own, and have never owned any, bottleneck infrastructure, hence are not incumbents elsewhere. Thus, the pool of potential entrants consists of the existing railroad companies under the reciprocal switching, but more generally, the entrants can be both the existing firms entering a local market and new firm to the industry.

Economic theory suggests a reduction in future rail investments resulting from the Board's proposed regulation, given the specific context of the project. On balance, the theoretical case in favor of more investment pursuant the Board's suggestion is weak. Some pro-investment arguments simply do not apply. For example, entry of new firms into the marketplace—which was found to be driving counterbalancing force in the EU telecoms industry—is not likely in the U.S. railroad industry. In contrast, incumbent railroads will be discouraged from investing in future infrastructure due to both the asymmetric risk of seeing traffic poached (while bearing the full cost of the investments if the desired traffic does not materialize) and the reduction in the expected NPV of future investments.

My empirical research in the telecommunications industry also predicts a material reduction in long-term investment should the Board relax its current standards for forced reciprocal switching. Our empirical findings are instructive. Easier access conditions implemented over time by the national regulators in the EU resulted in a substantial loss of investment in the telecoms infrastructure: €16.4 billion ($15 billion) over a decade, which corresponds to net loss of over 20% of the total industry infrastructure stock.

But new firms entering the U.S. rail market is virtually ruled out. Our empirical work reveals that had the entry of new firms into the marketplace not happen, the loss of investment in the EU telecom industry would have been more than twice as large according to the Grajek and Röller's (2012) model. In other words, without this counterbalancing force—which will not occur in the U.S railroad context—our empirical research revealed that access regulations resulted in a loss of investments by incumbent firms of more than €40 billion ($36.5 billion).

In sum, in light of the economic literature and my own empirical research on the effects of access regulation, I expect the revised reciprocal switching regulations will have a pronounced negative impact on future investment in U.S. railroad infrastructure. The full scope of the long-term tradeoff in lost investment will depend critically on how broadly the new rules apply and

how stringent the access conditions are, including compensation. According to analysis by Mr. Baranowski submitted into this docket by the Association of American Railroads in these proceedings, which I have reviewed, the breadth of the Board's dual proposals to grant forced switching will capture a massive amount of traffic. In my opinion, the proposed revised reciprocal switching regulations, especially if coupled with access conditions that do not adequately compensate the infrastructure owners, for instance, by ignoring the opportunity cost in the Efficient Component Pricing Rule (ECPR), will put a significant strain on the future investment in U.S. rail infrastructure and the ability of the industry to meet the transportation needs of the U.S. economy in the coming decades.

In deciding the wisdom of its proposal, I urge the Board to consider the lessons from other industries and the tradeoff from forced access regimes that has been demonstrated to discourage future investment in infrastructure.

References

Briglauer, Wolfgang, Carlo Cambini, and Michał Grajek. 2015. "Why is Europe lagging on next generation access networks?" Bruegel Policy Contribution, Issue 2015/14.

Foros, Oystein. 2004. "Strategic Investments with Spillovers, Vertical Integration and Foreclosure in the Broadband Access Market." International Journal of Industrial Organization 22(1): 1–24.

Gans, Joshua. 2001. "Regulating Private Infrastructure Investment: Optimal Pricing for Access to Essential Facilities." Journal of Regulatory Economics 20(2): 167–189.

Gans, Joshua, and Philip Williams. 1999. "Access Regulation and the Timing of Infrastructure Investment." Economic Record 75(2): 127–137.

Grajek, Michał, and Lars-Hendrik Röller. 1992. "Regulation and investment in network industries: Evidence from European telecoms." Journal of Law and Economics 55(1): 189–216.

Guthrie, Graeme. 2006. "Regulating Infrastructure: The Impact on Risk and Investment." Journal of Economic Literature 44(4): 925-972.

Hausman, Jerry A. 1997. "Valuing the Effect of Regulation on New Services in Telecommunications." Brookings Papers on Economic Activity: Microeconomics 1-38.

Hellwig, Martin. 2008. "Competition Policy and Sector-Specific Regulation for Network Industries." MPI Collective Goods Preprint, No. 2008/29.

Jorde, Thomas M., J. Gregory Sidak, and David J. Teece. 2000. “Innovation, Investments, and Unbundling.” Yale Journal of Regulation 17: 1–37.

Kotakorpi, Kaisa. 2006. “Access Price Regulation, Investment and Entry in Telecommunications.” International Journal of Industrial Organization 24(5): 1013–1020.

Laffont, Jean-Jacques, and Jean Tirole. 2000. Competition in Telecommunications. Cambridge, MA: MIT Press.

Newbery, David M. 2002. Privatization, Restructuring, and Regulation of Network Utilities. Cambridge, MA: MIT Press.

Pindyck, Robert S. 2007. “Mandatory Unbundling and Irreversible Investment in Telecom Networks.” Review of Network Economics 6(3): 274–298.

Rey, Patrick, and Jean Tirole. 2007. “A Primer on Foreclosure.” 2145–2220 in Handbook of Industrial Organization, Vol. 3, edited by Mark Armstrong and Robert H. Porter. Amsterdam: North-Holland.

Sibley, David S., and Dennis L. Weismann. 1998. “Raising Rivals' Costs: The Entry of an Upstream Monopolist into Downstream Markets.” Information Economics and Policy 10(4): 451–470.

VERIFICATION

I, Michał Grajek, declare under penalty of perjury that my Verified Statement is true and correct to the best of my knowledge, belief, and information. Further, I certify that I am qualified and authorized to file this statement.

Michał Grajek

Executed on 20th of October 2016.

Attachment A
to
Verified Statement
of
Michal Grajek
to
Opening Comments of
Norfolk Southern Railway Company

Ex Parte No. 711
Reciprocal Switching

Michał Grajek

Address

ESMT Berlin
Schlossplatz 1
10178 Berlin
Germany

Phone: +49-30-212 31 -1047
Fax: -1281

Email: michal.grajek@esmt.org
www.esmt.org

Current employment

Director of Research, January 2013–present;
Associate Professor, January 2010–present;
Assistant Professor, January 2007–January 2010;
ESMT Berlin, Germany.

Visiting Fellow, Bruegel, Brussels, 2012-present.

Education

Dr. rer. pol. (summa cum laude). Thesis: *Network Effects, Compatibility, and Adoption of Standards: Essays in Empirical Industrial Economics*, Humboldt-University Berlin, Berlin, Germany, 2004.

MA in Economics (with Honors), Thesis: *Gender Discrimination in the Polish Labor Market*, Warsaw University, Warsaw, Poland, 1999.

Undergraduate studies in Economics, Columbia University, New York, U.S.A., Warsaw University, Warsaw, Poland, 1998.

Past employment

Research Fellow, Institute Competitiveness and Industrial Change, Social Science Research Center Berlin (WZB), Berlin, Germany, October 2002–December 2006.

Research Fellow, Institute of Industrial Organization, Department of Economics, Humboldt University, Berlin, Germany, August 2004–December 2006.

Teaching experience

ESMT Berlin, Germany. Microeconomics (MBA, 2007-2011), Markets & Regulation (MBA, 2008-2010), Introduction to Economic Thinking (MBA, 2012-present), Introduction to Economic Thinking (Executive MBA, 2007-present), Business Economics (Exed Program, 2014, 2015, 2016).

Humboldt University, Berlin, Germany. Empirical Industrial Organization (undergraduate tutorial, 2006/2007).

Warsaw University of Technology Business School, Warsaw, Poland. Microeconomics (MBA, 2005-2007).

Warsaw University, Warsaw, Poland. Microeconomics (undergraduate tutorial, 2000).

Journal publications

Clougherty, J.A., and M. Grajek (2014). International standards and international trade: Empirical evidence from ISO 9000 diffusion. *International Journal of Industrial Organization* 36(5): 70–82.

Grajek, M., and T. Kretschmer (2012). Identifying critical mass in the global cellular telephony market. *International Journal of Industrial Organization* 30(6): 496–507.

Grajek, M., and L.-H. Röller (2012). Regulation and investment in network industries: Evidence from European telecoms. *Journal of Law and Economics* 55(1): 189–216.

Beck, J., M. Grajek, and C. Wey (2011). Estimating level effects in diffusion of a new technology: Barcode scanning at the checkout counter. *Applied Economics* 43(14): 1737–1748.

Grajek, M. (2010). Estimating network effects and compatibility: Evidence from the Polish mobile market. *Information Economics and Policy* 22(2): 130–143.

Grajek, M., and T. Kretschmer (2009). Usage and diffusion of cellular telephony, 1998-2004. *International Journal of Industrial Organization* 27(2): 238–249.

Clougherty, J., and M. Grajek (2008). The impact of ISO 9000 diffusion on trade and FDI: A new institutional analysis. *Journal of International Business Studies* 39(4): 613–633.

Grajek, M. (2003). Gender pay gap in Poland. *Economics of Planning* 36(1): 23–44.

Grajek, M. (2002). Prognozy łączone [Combined forecasts] (in Polish with English summary). *Przegląd Statystyczny* 49(2): 69–81.

Other publications

Cambini, C., W. Briglauer, and M. Grajek (2015). *Why is Europe lagging on next generation access networks?* Bruegel Policy Contribution, Issue 2015/14.

Grajek, M. (2012). *ICT for growth: A targeted approach*. Bruegel Policy Contribution, Issue 2012/10.

Friederiszick, H. W., J. Kałużny, S. Kohnz, M. Grajek, and L.-H. Röller (2011). *Assessment of a sustainable Internet model for the near future*. ESMT White Paper No. WP–11–01.

Friederiszick, H. W., J. Kałużny, S. Kohnz, M. Grajek, and L.-H. Röller (2011). *Assessment of a sustainable Internet model for the near future*. ESMT Business Brief No. BB–11–01.

Friederiszick, H., M. Grajek, and L.-H. Röller (2008). *Analyzing the relationship between regulation and investment in the telecom sector.* ESMT White Paper No. WP–108–01.

Grajek, M. (2007). *Mehr Handel dank Gütesiegel [ISO 9000 and trade]*. WZB-Mitteilungen 115.

Working papers

Clougherty, J.A., and M. Grajek (2012). *International standards and international trade: Empirical evidence from ISO 9000 diffusion*. NBER Working Paper No. 18132.

Eggers, J.P., M. Grajek, and T. Kretschmer (2012). *Performance implications of core and complementary pre-entry experience: The role of consumer heterogeneity in mobile telephony*. ESMT Working Paper No. 11–03 (R2).

Clougherty, J., and M. Grajek (2009). *ISO 9000: New form of protectionism or common language in international trade?* ESMT Working Paper No. 09–006.

Work in progress

Clougherty, J., M. Grajek and O. Shy (2016). *Taking 'Some' of the Mimicry Out of the Diffusion Process: The Adoption of Internationally-Recognized Quality Certifications and Strategic Substitution.*

Briglauer, W., C. Cambini and M. Grajek (2016). *Regulation and investment in European high-speed broadband infrastructure.*

M. Grajek, K. Gugler, T. Kretschmer, I. Miscisin (2014). *Merger effects in the wireless telecommunications industry.*

Eggers, J.P., M. Grajek, and T. Kretschmer (2014). *Founding alliances in cellular telephony markets.*

Grajek, M., and V. Stimac (2012). *The causal effect of preferential trade agreement on trade.*

Grants, awards and scholarships

President's Honor Roll for Teaching Excellence, Introduction to Economic Thinking, Executive MBA 2014-16, ESMT Berlin, 2016.

President's Honor Roll for Teaching Excellence, Introduction to Economic Thinking, MBA Class of 2013, European School of Management and Technology, 2011, 2012, 2013.

Research grant for a paper presented at the NBER Conference on Patents, Standards and Innovation (with Joseph Clougherty), 2011.

NET Institute (Stern School of Business, NYU) Summer Research Grant (with Tobias Kretschmer), 2006.

Verein für Socialpolitik Award for presentation held at the Annual Congress of the European Economic Association in Amsterdam, August 2005.

Humboldt University and Free University, Scholarship for PhD Program "Applied Microeconomics", October 2000–September 2002.

Warsaw University, Scholarship for PhD Program in Economics, October 1999–September 2000.

Academic service

Associate editor at the *Information Economics and Policy*, 2011–present

Ad-hoc referee for: RAND Journal of Economics, International Journal of Industrial Organization, Journal of Industrial Economics, Review of Industrial Organization, Information Economics and Policy, Telecommunications Policy, Journal of International Business Studies, Quantitative Marketing and Economics, Applied Economics Quarterly

Invited seminars

Clougherty, J.A., and M. Grajek. *Identifying critical mass in the global cellular telephony market*. IB Research Seminar. University of Illinois at Urbana-Champaign. 2 November 2012.

Grajek, M., and T. Kretschmer. *Measuring critical mass in the global cellular telephony market*. Research Seminar. Telecom ParisTech. 5 April 2012.

Grajek, M., and L.-H. Röller. *Regulation and investment in network industries: Evidence from European telecoms.* Research Seminar. Vienna University of Economics and Business. 6 May 2011.

Grajek, M., and T. Kretschmer. *What does market share buy you? An empirical investigation of first-mover advantages in the mobile phone industry.* University of Amsterdam. 24 September 2010.

Grajek, M., and L.-H. Röller. *Regulation and investment in network industries: Evidence from European telecoms*. Economics Seminar. Tilburg University. 21 October 2008.

Friederiszick, H., M. Grajek, and L.-H. Röller. *Analyzing the relationship between regulation and investment in the telecom sector*. Research Seminar. Erlangen-Nuremberg University. 11 June 2008.

Friederiszick, H., M. Grajek, and L.-H. Röller. *Analyzing the relationship between regulation and investment in the telecom sector*. Regulation and Competition Seminar. University Pompeu Fabra, Barcelona. 24 April 2008.

Grajek, M., and T. Kretschmer. *Usage and diffusion of cellular telephony, 1998–2004*. Research Seminar, Central European University (CEU), Budapest. 10 December 2007.

Grajek, M. *Estimating network effects and compatibility in mobile telecommunications*. Research Seminar, Center for Digital Technology and Management, Munich University (LMU). 11 May 2007.

Clougherty, J. and M. Grajek. *The impact of ISO 9000 diffusion on trade and FDI: A new institutional analysis*. Economics Department Research Seminar, Warsaw University. 1 March 2007.

Selected conference presentations

Briglauer, W., C. Cambini and M. Grajek. *Regulation and investment in European high-speed broadband infrastructure*. Annual Conference of the European Association for Research in Industrial Economics, EARIE, Nova School of Business and Economics, Lisbon. 28 August 2016.

Briglauer, W., C. Cambini and M. Grajek. *Regulation and investment in European high-speed broadband infrastructure*. 11th International Conference on Competition and Regulation, CRESSE, Athens University of Economics and Business, Rhodes. 1 July 2016.

Briglauer, W., C. Cambini and M. Grajek. *Regulation and investment in European high-speed broadband infrastructure.* Business and Public Policy Workshop, ESADE, Barcelona. 22 April 2016.

Clougherty, J., Grajek, M., and O. Shy. *International quality standards and competition in the international markets*. Business and Public Policy in a Global Economy Conference, McDonough School of Business, Georgetown University, Washington DC. 13 March 2014.

Eggers, J.P., M. Grajek, and T. Kretschmer. *Performance implications of core and complementarity pre-entry. The role of consumers' heterogeneity in mobile telephony*. Workshop on Telecommunications Economics, Barcelona. 13 March 2013.

Grajek, M., and T. Kretschmer. *Measuring critical mass in the global cellular telephony market*. Annual Conference of the European Association for Research in Industrial Economics (EARIE), Rome. 2–4 September 2012.

Eggers, J.P., M. Grajek, and T. Kretschmer. *Decomposing first mover advantages in the mobile telecommunications industry.* 3rd Workshop on the Economics of ICTs, Oporto. 22 March 2012.

Clougherty, J., and M. Grajek. *International standards and international trade: Empirical evidence from ISO 9000 diffusion.* National Bureau of Economic Research (NBER) Standards, Patents and Innovation Conference, Tucson. 20-21 January 2012.

Grajek, M., and T. Kretschmer. *Measuring critical mass in the global cellular telephony market*. 8th Christmas Meeting of German Economists Abroad, Berlin. 20-21 December 2011.

Eggers, J.P., M. Grajek, and T. Kretschmer. *Decomposing first mover advantages in the mobile telecommunications industry.* Annual Conference of the European Association for Research in Industrial Economics (EARIE), Stockholm. 1–3 September 2011.

Grajek, M., and L.-H. Röller. *Regulation and investment in network industries: Evidence from European telecoms.* Conference on Privatization and Liberalization, Södertörn University and the Stockholm School of Economics, Stockholm. 16-17 June 2011.

Eggers, J.P., M. Grajek, and T. Kretschmer. *First mover advantages and firm resources in the mobile telecommunications industry*. IO Workshop. European School of Management and Technology (ESMT). 25-26 November 2010.

Grajek, M., and L.-H. Röller. *Regulation and investment in network industries: Evidence from European telecoms.* 25th Annual Congress of the European Economic Association, Glasgow. 23–26 August 2010.

Grajek, M., and T. Kretschmer. *What does market share buy you? An empirical investigation of first-mover advantages in the mobile phone industry.* 6th Annual International Industrial Organization Conference (IIOC), Vancouver, Canada. 14–16 May 2010.

Grajek, M., and L.-H. Röller. *Regulation and investment in network industries: Evidence from European telecoms*. International Conference on Infrastructure Economics and Development, Toulouse. 14–15 January 2010.

Clougherty, J., and M. Grajek. *ISO 9000: New form of protectionism or common language in international trade?* Annual Conference of the European Association for Research in Industrial Economics (EARIE), Ljubljana. 3–5 September 2009.

Clougherty, J., and M. Grajek. *ISO 9000: New form of protectionism or common language in international trade?* 4th Warsaw International Economics Meeting, Warsaw. 3–5 July 2009.

Grajek, M., and L.-H. Röller. *Regulation and investment in network industries: Evidence from European telecoms.* ZEW Conference on the Impact of Regulation on Investment and Innovation Incentives, Mannheim. 1–2 October 2008.

Friederiszick, H., M. Grajek, and L.-H. Röller. *Analyzing the relationship between regulation and investment in the telecom sector.* Annual Conference of the European Association for Research in Industrial Economics (EARIE), Toulouse. 4–6 September 2008.

Friederiszick, H., M. Grajek, and L.-H. Röller. *Analyzing the relationship between regulation and investment in the telecom sector.* 3rd Warsaw International Economics Meeting, Warsaw. 4–6 July 2008.

Friederiszick, H., M. Grajek, and L.-H. Röller. *Analyzing the relationship between regulation and investment in the telecom sector.* Telecom ParisTech Conference on Economics of ICT, Paris. 19–20 June 2008.

Friederiszick, H., M. Grajek, and L.-H. Röller. *Analyzing the relationship between regulation and investment in the telecom sector.* 6th Annual International Industrial Organization Conference (IIOC), Washington, DC. 16–18 May 2008.

Clougherty, J., and M. Grajek. *ISO 9000: New form of protectionism or common language in international trade?* European Trade Study Group (ETSG) Conference, Athens. 13–15 September 2007.

Clougherty, J., and M. Grajek. *The impact of ISO 9000 diffusion on trade and FDI: A new institutional analysis*. Annual Conference of the European Association for Research in Industrial Economics (EARIE), Valencia. 6–9 September 2007.

Grajek, M., and T. Kretschmer. *Critical mass – A simple operationalization*. Warsaw International Economic Meeting (WIEM), Warsaw. 6–8 July 2007.

Grajek, M., and T. Kretschmer. *Usage and diffusion of cellular telephony, 1998–2004*. Annual Conference of the European Association for Research in Industrial Economics (EARIE), Amsterdam. 25–27 August 2006.

Grajek, M., and T. Kretschmer. *Usage and diffusion of cellular telephony, 1998–2004*. Warsaw Economic Meeting, Warsaw. 1–2 July 2006.

Grajek, M., and T. Kretschmer. *Usage and diffusion of cellular telephony, 1998–2004*. Telecom Paris Conference on the Economics of Information and Communication Technologies, Paris. 23–24 June 2006.

Grajek, M., and T. Kretschmer. *Usage and diffusion of cellular telephony, 1998-2004*. 4th Annual International Industrial Organization Conference (IIOC), Boston, MA. 7–9 April 2006.

Grajek, M. *Diffusion of ISO 9000 standards and international trade.* Annual Conference of the European Association for Research in Industrial Economics (EARIE), Porto. 1–4 September 2005.

Grajek, M. *Diffusion of ISO 9000 standards and international trade.* Annual Congress of the European Economic Association (EEA), Amsterdam. 24–27 August 2005.

Grajek, M. *Estimating network effects and compatibility in mobile telecommunications*. Annual Conference of the European Association for Research in Industrial Economics (EARIE), Berlin. 2–5 September 2004.

Grajek, M. *Estimating network effects and compatibility in mobile telecommunications.* Kiel-Munich Workshop on Economics of Information and Network Industries, Kloster Seeon. 30–31 August 2004.

Grajek, M. *Identification of network externalities in markets for non-durables.* Annual Conference of the European Association for Research in Industrial Economics (EARIE), Helsinki. 24–26 August 2003.

Grajek, M. *Identification of network externalities in markets for non-durables.* Annual Symposium of the Society for Nonlinear Dynamics and Econometrics, Florence. 13–15 March 2003.

Languages

Polish (native), English (high proficiency), German (high proficiency), Russian.

Updated: October 18, 2016

Attachment B
to
Verified Statement
of
Michal Grajek
to
Opening Comments of
Norfolk Southern Railway Company

Ex Parte No. 711
Reciprocal Switching

Regulation and Investment in Network Industries: Evidence from European Telecoms

Michał Grajek *ESMT European School of Management and Technology*
Lars-Hendrik Röller *ESMT European School of Management and Technology*

Abstract

We provide evidence of an inherent trade-off between access regulation and investment incentives in telecommunications by using a comprehensive data set covering more than 70 fixed-line operators in 20 countries over 10 years. Our econometric model accommodates different investment incentives for incumbents and entrants, a strategic interaction of entrants' and incumbents' investments, and endogenous regulation. We find access regulation to have a negative effect on both total industry and individual carrier investment. Thus, promoting market entry by means of regulated access undermines incentives to invest in facilities-based competition. Moreover, we find evidence of a regulatory commitment problem: higher investments by incumbents encourage regulated access provision.

1. Introduction

The rationale for access regulation in network industries is to intensify competition in order to promote efficiency and thereby enhance social welfare. One example of access regulation that is particularly relevant to this study is the European Union (EU) mandate that opened telecommunications markets to competition by requiring incumbent suppliers to unbundle their networks and make the network elements available to retail competitors at regulated prices

We thank Martin Cave, Martin Peitz, David Salant, Ingo Vogelsang, the editor, and the anonymous referee for comments, as well as seminar participants at Pompeu Fabra University, Tilburg University, the International Industrial Organization Conference in Washington, D.C. (May 16–18, 2008), and the European Association for Research in Industrial Economics Conference in Toulouse (September 4–6, 2008). Special thanks go to Hans Friederiszick for his valuable comments and input. Tseveen Gantumur provided excellent research assistance. Financial support from Deutsche Telekom AG is gratefully acknowledged.

[*Journal of Law and Economics*, vol. 55 (February 2012)]
 0022-2186/2012/5501-0007$10.00

(Commission Regulation 2887/2000, Unbundled Access to the Local Loop, 2000 O.J. [L 336] 4–8; Council Directive 2002/19/EC, Access to, and Interconnection of, Electronic Communications Networks and Associated Facilities, 2002 O.J. [L 108] 7–17). The U.S. Telecommunications Act of 1996 (Pub. L. No. 104-104, 110 Stat. 56 [1996]) is another prominent example. In a static environment, mandated access increases competition, which lowers prices and results in a higher consumer surplus. In dynamic settings, the relationship between access regulation and welfare is more complicated. Lower access prices might increase competition in the short term but undermine the incentives of incumbents to invest in the network; higher access prices provide stronger incentives to invest but impede the entrants' use of incumbents' infrastructure and thereby reduce competition (see, for instance, Laffont and Tirole 2000; Newbery 2002).

The regulation/investment trade-off is further complicated by entrants' investment incentives. The role of access regulation with respect to infrastructure investment by entrants is inherently ambivalent (Hellwig 2008): access regulation reduces barriers to entry because entrants do not need to duplicate the existing network, but it also reduces incentives to build new infrastructure because infrastructure can be rented from incumbents at mandated prices. This trade-off is reflected in what is known as facilities-based competition (entrants invest in their own infrastructure) versus service-based competition (entrants rely on regulated access to incumbents' infrastructure).[1] Permitting relatively easy access to incumbents' infrastructure might thus undermine not only incumbents' incentives but also entrants' incentives to invest in infrastructure.[2]

Although it is suggested that easy access limits entrants' incentives to invest in facilities-based competition, this might not be the case for entrants' investment in upgrading incumbents' infrastructure. For example, to enable broadband access to the Internet via an unbundled local loop, an entrant needs to upgrade the local loop as well as invest in the backbone network. Every entry other than the simple reselling of incumbent services thus requires further investment. But these two types of investment differ fundamentally with respect to easy access in that incentives to invest in upgrades might grow out of, and thus be aligned with, easy access provisions (Woroch 1998), in contrast to investments in facilities-based competition (such as in the cable industry), which are not aligned.

These inherent trade-offs have important implications for policy. Many policy makers argue that facilities-based competition affords advantages of variety, low price, and innovation, whereas service-based competition provides only price benefits that result from regulator-promoted access (Cave 2006b). Empirical

[1] Although infrastructure leasing is not needed, interconnection issues among competing networks and bilateral access prices might exist under facility-based competition. For an analysis of regulatory issues in such two-way networks, as opposed to one-way networks in which entrants have access to incumbents' essential facilities, see Valletti (2003).

[2] A variant of this trade-off is emphasized by the so-called ladder hypothesis of investment (Cave and Vogelsang 2003; Cave 2006a, 2006b), also referred to as the stepping stone hypothesis (Rosston and Noll 2002), which suggests that easy access is needed to promote entry and greater infrastructure investment in the long run.

evidence from broadband networks suggests that infrastructure competition between digital subscriber line (DSL) and cable TV providers had a significant positive impact on broadband deployment (Höffler 2007). If facilities-based competition is the ultimate objective of regulators, then incentives for infrastructure investments become a key policy concern.[3]

Empirical assessments need to take into account that incumbents' and entrants' investment incentives are fundamentally different and might not be aligned. This paper establishes an empirical framework for identifying the effect of access regulation on investment by treating incumbents' and entrants' investment decisions as interdependent. Estimating via separate equations the impact of regulation on entrants and incumbents enables us to identify the differential effects on investment incentives between the two as well as the strategic effect of infrastructure investments; it enables us to identify incumbents' and entrants' investments as strategic substitutes or complements.

We further allow for regulation to be endogenous, given that regulatory commitment is highly relevant to long-term investment decisions in regulated (or potentially regulated) industries.[4] The fact that regulatory outcomes, such as unbundling policies and mandated access prices, are subject to political and administrative processes gives rise to a fundamental endogeneity problem. For example, when a regulator's objective is to promote competition to the benefit of the consumer, higher infrastructure investment by incumbents may cause national regulators to provide cheaper access. This, however, will undermine the incumbent's incentives to invest in infrastructure in the first place, giving rise to a regulatory commitment problem. Consequently, regulation needs to be treated as endogenous.

We estimate our econometric model using a comprehensive new data set that covers more than 70 fixed-line operators in 20 EU member states over a 10-

[3] Facilities-based competition might ultimately provide greater benefits in terms of variety, long-term pricing, and innovation. According to the European Commission, "empirical evidence shows that investment and innovation are strongest where there is effective competition between infrastructures. However, there is still no infrastructure-based competition on around 80 percent of the EU's local loops. This means that, ex-ante, regulation continues to play a crucial role in maintaining competition and protecting consumers by setting conditions for access to the incumbent's infrastructure" (Commission Staff Working Document, Summary of the Impact Assessment, 2, SEC [2007] 1473).

[4] Freixas, Guesnerie, and Tirole (1985) were the first to point out that regulatory noncommitment is crucial to the ratchet effect (firms in centrally planned economies underproduce to avoid demanding schemes in the future). More recently, Sidak and Spulber (1996) discuss circumstances under which mandatory unbundling can lead to deregulatory takings by opportunistic regulatory agencies taking a legal perspective. See also Newbery (2002) for an extensive discussion of the problem of regulatory commitment. Crandall (2005, p. 71) shows that U.S. access prices in 2002 were negatively correlated with capital spending of incumbent telecom companies in 1996–99, which suggests that regulators exploit investment ex post (regulatory takings) by reducing the rate at which the investing company is obliged to lease its network to competitors. Duso and Röller (2003) show that the degree of deregulation in the mobile telecommunications industry is explained largely by political variables.

year period.[5] Among the advantages of using this data set to study investment incentives in regulated industries is that it enables us to differentiate between the impact of regulation on incumbents and entrants and to abstract from cable competition to focus on telecom operators, as competition from cable is much less developed in Europe than, for example, in the United States. According to the Organisation for Economic Co-operation and Development (OECD 2007), EU member states typically have low cable penetration rates (for the Czech Republic, the rate is 24 percent; Hungary, 8 percent; Poland, 34 percent; Spain, 57 percent; Sweden, 50 percent; and the United Kingdom, 50 percent), compared to rates near 100 percent in the United States.[6]

Finally, our data set makes use of a new regulatory index based on the number of existing legal measures that facilitate one-way access to incumbents' networks. Other studies use as the regulatory variable a mandated access price such as the local loop unbundling (LLU) rental rate used by Crandall, Ingraham, and Singer (2004).[7] Our indicator of access regulation over access price has two important advantages: it reflects access at different levels of infrastructure (for example, LLU, line sharing, and bitstream access), whereas available access price reflects only LLU, and it is better suited to the context of international comparisons, because it is independent of country-specific costs of building infrastructure. Moreover, given that our index is based exclusively on regulatory measures as opposed to entry or market shares, it represents a significant improvement over the existing OECD index used in other studies (for example, Alesina et al. 2005), which, because it is based in part on the number of entrants, does not distinguish regulation from competition.

The principal empirical findings of our study of the impact of access regulation on investment are as follows:

1. We find empirical support for the differential impact of access regulation on the investment decisions of incumbents and entrants. Access regulation discourages investment by incumbents and individual entrants even as entrants' total investment increases. Moreover, incumbents' investment reacts to entrants' investments. That is, incumbents invest more as entrants' total investment increases.
2. In terms of magnitude, we estimate the overall effect of access regulation on total industry investment in Europe to be a loss of some €16.4 billion over the past 10 years.

[5] The data set was assembled by Competition Analysis, a consulting partner of the European School of Management Technology (Friederiszick, Grajek, and Röller 2008), with the support of Deutsche Telekom.

[6] According to OECD (2009), the average share of cable broadband in the European Union (EU) in 2006 was 20 percent, while it was 53 percent in Canada and the United States. In addition, one observes a sharp decline in cable broadband in the EU, while the same figures in Canada and the United States are stable. This suggests that cable broadband has been losing ground in the EU and was unlikely to be able to exert significant competitive pressure on European telecom operators for the period that we study. For additional robustness checks, see Section 5.

[7] We use the local loop unbundling (LLU) rates to test the robustness of our regulatory index.

3. We find that endogeneity of regulation matters empirically. To be specific, absent controlling for endogenous regulation, we do not find any significant impact of regulation on investment but do identify a significant effect when regulation is permitted to be endogenously determined by the level of infrastructure investment.
4. In terms of regulatory determinants, we find regulatory responses to infrastructure investments to differ between incumbents and entrants. Whereas access regulation is not affected by entrants' investment, regulators permit easier access in response to increased investment by incumbents.

Before proceeding, we would like to emphasize that the focus of this paper is on investment, not welfare. Although the two are related, we do not examine the effect of investment on consumer prices. As a result, our conclusions cannot be used to assess regulation in general welfare terms.

The rest of the paper is organized as follows. In Section 2, we review the literature on investment and regulation in network industries, with a focus on telecommunications. Our econometric model is introduced in Section 3. Data, descriptive results, and instruments are discussed in Section 4. In Section 5, we present our empirical results. We conclude our paper in Section 6.

2. Literature Review

Competition in retail markets can be significantly affected by elements of infrastructure that have natural monopoly properties, with the local loop that connects individual households to the local switch being a prominent example in the telecommunications infrastructure. Duplicating the copper lines in local loops is expensive, at least for the purpose of providing an alternative path for traditional telecommunications service.[8]

In both Europe and the United States, the infrastructure bottleneck was typically resolved by mandating unbundling and sharing of the local loop to provide access to the incumbent's telephone network.[9] Such provisions increase the likelihood of successful entry but reduce the rent that can be earned from infrastructure investments. Because access regulation encourages efficient utilization of infrastructure but has the potential to discourage investment (Valletti 2003), the literature has emphasized a regulatory trade-off between static and dynamic incentives.

Although evidence that access regulation has enhanced static efficiencies abounds, debate persists regarding the impact of access regulation on investments

[8] The natural monopoly features of traditional fixed-line networks are diminishing in importance (Hellwig 2008) as technological progress facilitates the development of alternative networks that deliver similar services and as mobile telecommunications and cable networks offer services that, although imperfect substitutes, nevertheless exert competitive pressure on incumbents.

[9] See Crandall and Waverman (2006) for a recent overview of the industry and regulatory trends on both sides of the Atlantic.

in telecommunications.[10] The Federal Communications Commission (FCC) has recently moved away from access regulation applied to broadband entry (Nuechterlein and Weiser 2005), but access regulation and LLU continue to be the dominant regulatory paradigms in Europe.[11] As a result, while U.S. incumbent operators could circumvent access regulation when investing in broadband networks, the European incumbents did not have this option.

2.1. Impact of Access Regulation on Investment: Theoretical Perspectives

Access regulation has been demonstrated to have a negative impact on investment in a number of theoretical settings, including lowering the net present value (NPV) of incumbents' investments, shifting the risk from entrants to incumbents, and increasing incumbents' risk exposure and, thereby, cost of capital.[12]

The first line of argument emphasizes that rents earned from leasing infrastructure at cost-based prices are lower than monopoly rents realized from owning and selling the infrastructure directly to consumers (Valletti 2003). Under NPV calculations, investments are thus less likely (to be profitable) when access is regulated (Pindyck 2007).

In the context of the considerable uncertainty regarding whether telecommunication infrastructure investment will be adequately reflected in cost-based access charges (Hausman 1997; Jorde, Sidak, and Teece 2000; Haring and Rohlfs 2002; Valletti 2003; Baake, Kamecke, and Wey 2005; Pindyck 2007), incumbents bear all the investment risk under mandated access, while entrants enjoy a risk-free option to lease infrastructure and exploit the regulatory arbitrage between wholesale and retail prices when demand uncertainty is resolved. Cost-based access charges that do not accommodate this risk reduce incumbents' incentives to invest to suboptimal levels (as defined by the NPV). The risk-free option also adversely affects entrants' ex ante incentives to invest in their own infrastructure.

Finally, shifting the risk from entrants to incumbents through cost-based access regulation—if it increases the latter's cost of capital (Jorde, Sidak, and Teece 2000)—will reduce incumbents' ability to invest. The argument is as follows. When uncertainty plays out unfavorably (that is, when demand for telecommunications services turns out to be weak), entrants are more likely to lease local loops. When it plays out favorably and demand is strong, entrants will, because of higher prices for services, be able to afford to roll out their own networks. Because cost-based access charges undercompensate their investment, incumbents' returns will suffer in times of recession and improve during expansion. Investors must be compensated for volatility in incumbents' returns

[10] A large body of literature examines the question of how to set access charges so as to allocate resources efficiently (see, for example, Armstrong, Doyle, and Vickers 1996; Armstrong 2002).

[11] De Bijl and Peitz (2005) provide a recent overview of developments in the telecommunications market in Europe.

[12] See Guthrie (2006) and Armstrong and Sappington (2006) for a comprehensive literature overview.

on assets relative to the market with higher returns on their stocks, which increases the cost of equity.[13]

A number of theoretical contributions, on the other hand, suggest a positive effect of access regulation on investment. As has been pointed out in the literature, a vertically integrated incumbent may not raise a retail competitor's costs if the competitor is more efficient (Rey and Tirole 2007; Sibley and Weisman 1998). Taking this theory a step further, Foros (2004) and Kotakorpi (2006) show that service-based competition—if it increases variety and innovation and, concomitantly, demand—might encourage investment by incumbents. It is crucial, though, that incumbents be able to appropriate profits from increased demand through sufficiently high (possibly unregulated) access charges. The cost-based access charges set by U.S. and EU regulators have been criticized for being too low (Pindyck 2007).[14]

According to the investment ladder hypothesis (Cave and Vogelsang 2003; Cave 2006a), entrants enabled by low access fees to build up an installed base and learn about demand and cost conditions will subsequently be encouraged by rising access charges, together with technological progress and falling costs, to roll out their own networks and commence facilities-based competition.[15] This has been formalized by Bourreau and Dogan (2005, 2006), who show that optimal (from the incumbent's viewpoint) access charges that are rendered prohibitively high when there is no effective threat of facilities-based entry will decrease over time as technological progress renders entry less expensive. Following this strategy would enable an incumbent to forestall facilities-based entry while extracting the maximum rent from entrants.

Finally, access regulation can precipitate a race to provide infrastructure that plays out as increased investment by both incumbents and entrants (Gans and Williams 1999; Gans 2001; Guthrie 2006). The argument goes back to the preemption incentives studied in the context of innovation-timing games (Fudenberg and Tirole 1985; Katz and Shapiro 1987). This race to preempt is particularly relevant to investment in upgrades, such as to broadband Internet provision via DSL. Incumbents who, as a result of the well-known replacement effect, are reluctant to upgrade prior to access regulation will, under access regulation, recognize that the opportunity cost of not upgrading is that an entrant will upgrade.

2.2. Impact of Access Regulation on Investment: Empirical Evidence

Robust empirical analyses of the role of access regulation in investment in rapidly developing telecommunications markets are few and far between.[16] Haus-

[13] Using U.S. data, Ingraham and Sidak (2003) present econometric evidence that supports this hypothesis.

[14] Valletti (2003) and Vogelsang (2003) provide a general overview of access pricing and its possible effect on innovation and investment.

[15] Sappington (2005) argues, however, that entrants' rent-or-make decision might be largely insensitive to access charges and that entrants might be willing to pay rental charges that are higher than cost to constrain retail competition.

[16] See also the recent literature survey in Cambini and Jiang (2009).

man and Sidak (2005) conclude from their descriptive, case-based analyses of telecom markets in Canada, Germany, New Zealand, the United Kingdom, and the United States that mandatory unbundling failed to spur infrastructure investments by incumbents or entrants.

From their finding that low local loop rental rates reduce entrants' facilities-based lines, Crandall, Ingraham, and Sidak (2004) conclude that unbundling decreases facilities-based competition. Furthermore, from estimating the relationship between access price and incumbents' infrastructure investment, Chang, Koski, and Majumdar (2003) conclude that low access prices spur investment. Our study estimates both incumbents' and entrants' investments and accommodates the strategic interaction between them.

Studies of the impact of regulation on telecommunications investment that aggregates the fixed-line and mobile segments (Li and Xu 2004; Alesina et al. 2005) find a positive impact of entry liberalization and competition on total investment but cannot draw a conclusion about individual segments with quite different competitive landscapes.[17] Studies of broadband penetration (Wallsten 2005, 2006), an important indicator of a telecommunications market's degree of development as it captures both supply- and demand-side factors, report a negative impact of LLU on broadband. Because it examines investments of individual telecom operators, our study enables us to derive policy conclusions and test in more detail a number of predictions.

Finally, most of these studies acknowledge the problem of endogeneity with respect to regulation, but few tackle it econometrically.[18] Our data enable us to employ a set of unique instruments, including political and geographic variables, to accommodate endogeneity in regulation.

3. Econometric Model

To analyze the effect of regulation on investment, we consider a situation of one incumbent, several entrants, and a regulator. Our specification allows for the simultaneous determination of the level of regulation with the entrants' and incumbents' levels of infrastructure. In other words, regulation has an effect on incumbents' and entrants' investment decisions, which in turn affect regulation. Firms decide how much capacity to add to the existing infrastructure to offer an additional service to customers.[19]

We specify the regulation equation as follows:

[17] The most important difference is the economic viability of pure facilities-based competition, which is viable in mobile telecommunications with two or more parallel network infrastructures in many geographic markets but questionable in fixed-line telecommunications.

[18] Li and Xu (2004), which applies instrumental variables (IV) techniques, is an exception.

[19] An upgrade of the existing public switched telephone network lines to offer broadband Internet service based on digital subscriber line technology, for example.

$$\Delta \mathrm{Reg}_{i,t} = \alpha_i^{\mathrm{R}} + \lambda_t^{\mathrm{R}} + \beta^{\mathrm{R}} \mathrm{Reg}_{i,t-1} + \gamma^{\mathrm{R}} \mathrm{IncInf}_{i,t} + \delta^{\mathrm{R}} \Sigma \mathrm{EntInf}_{i,t} + \mathbf{X}_{i,t}^{\mathrm{R}} \boldsymbol{\theta}^{\mathrm{R}} + \eta_{i,t}, \tag{1}$$

where Reg_{it} is the intensity of regulation in a given national market i in year t, $\mathrm{IncInf}_{i,t}$ is the infrastructure stock of the incumbent, $\Sigma\mathrm{EntInf}_{i,t}$ is the sum of the stock of entrants' infrastructure, and Δ is the change from year $t-1$ to year t. The term $\boldsymbol{X}_{i,t}^{\mathrm{R}}$ is a set of control variables. The superscript R denotes variables and coefficients specific to the regulation equation.

Equation (1), our policy equation, endogenizes access regulation by making the intensity of regulation ($\mathrm{Reg}_{i,t}$) depend on the stock of infrastructure of both incumbents ($\mathrm{IncInf}_{i,t}$) and entrants ($\Sigma\mathrm{EntInf}_{i,t}$). We can thus investigate empirically whether a regulator is responding differently to investments by incumbents and entrants. When a regulator is more responsive to incumbents' infrastructure, then $\gamma^{\mathrm{R}} > \delta^{\mathrm{R}}$.

The incumbents' investment is given by

$$\Delta \mathrm{IncInf}_{i,t} = \alpha_i^{\mathrm{I}} + \lambda_t^{\mathrm{I}} + \beta^{\mathrm{I}} \mathrm{IncInf}_{i,t-1} + \gamma^{\mathrm{I}} \Sigma \mathrm{EntInf}_{i,t} + \delta^{\mathrm{I}} \mathrm{Reg}_{i,t} + \mathbf{X}_{i,t}^{\mathrm{I}} \boldsymbol{\theta}^{\mathbf{I}} + \varepsilon_{i,t}, \tag{2}$$

where $\boldsymbol{X}_{i,t}^{\mathrm{I}}$ is a set of control variables. The superscript I denotes variables and coefficients specific to equation (2), which stipulates that incumbents' investment ($\Delta\mathrm{IncInf}_{i,t}$) depends on the intensity of regulation ($\mathrm{Reg}_{i,t}$) and the sum of the stock of entrants' infrastructure ($\Sigma\mathrm{EntInf}_{i,t}$). Parameter δ^{I} is the impact of regulation on incumbents' investments, and parameter γ^{I} is the strategic effect of entrants' investment on incumbents' investment. Note that $\gamma^{\mathrm{I}} > 0$ is evidence that incumbents' and entrants' investments are strategic complements, and $\gamma^{\mathrm{I}} < 0$ is evidence that their investment decisions are substitutes. Since we use the logarithm of infrastructure stock, the results of the estimates are interpreted as percentage changes.

We model the sum of entrants' investment as follows:

$$\Delta \Sigma \mathrm{EntInf}_{i,t} = \alpha_i^{\mathrm{E}} + \lambda_t^{\mathrm{E}} + \beta^{\mathrm{E}} \Sigma \mathrm{EntInf}_{i,t-1} + \gamma^{\mathrm{E}} \mathrm{IncInf}_{i,t} + \delta^{\mathrm{E}} \mathrm{Reg}_{i,t} + \mathbf{X}_{i,t}^{\mathrm{E}} \boldsymbol{\theta}^{\mathrm{E}} + \zeta_{i,t}, \tag{3}$$

where $\boldsymbol{X}_{i,t}^{\mathrm{E}}$ is a set of control variables and superscript E denotes variables and coefficients specific to equation (3), which permits entrants' investment decisions ($\Sigma\mathrm{EntInf}_{i,t}$) to depend on the intensity of regulation ($\mathrm{R}_{i,t}$) and the stock of incumbents' infrastructure ($\mathrm{IncInf}_{i,t}$). Parameter δ^{E} measures the impact of regulation on entrants' investment decisions. When $\delta^{\mathrm{E}} < \delta^{\mathrm{I}}$, the impact of regulation on investment decisions is greater for incumbents than for entrants. Analogous to equation (2), when $\gamma^{\mathrm{E}} > 0$ ($\gamma^{\mathrm{E}} < 0$), incumbents' and entrants' investments are strategic complements (substitutes). Finally, we assume the errors $\eta_{i,t}$, $\varepsilon_{i,t}$, and $\zeta_{i,t}$ to be independently and identically distributed.[20]

[20] We report standard errors, which are robust to heteroskedasticity.

Note that by summing over all entrants in equations (1)–(3), we assume that regulators and incumbents react to aggregate investment by entrants. In other words, we treat de novo entry and investment by existing entrants analogously. In particular, we assume no strategic interaction between entrants because entrants' investments do not depend on each other in equation (3). This set of assumptions is consistent with the regional-based entry pattern observed in fixed-line telecommunications (Greenstein and Mazzeo 2006). When each entrant chooses a different region of operations, entrants can be assumed to behave strategically to regulation and incumbents' investments in that region only.

Later we also estimate a variant of equation (3) at the individual entrant level. Examining individual investments sheds more light on whether entry is facilities based or service based. Facilities-based entry is likely to involve substantially greater investment per entrant, while service-based entry requires less investment per entrant. Moreover, estimating equation (3) at the individual entrant level enables us to test for strategic interaction between entrants.

Note also that equations (1)–(3) include country dummies, year dummies, and lagged dependent variables.[21] Accordingly, the α_i terms capture country-specific effects, such as the cost of rolling out infrastructure, and the λ_t terms control for common time trends, such as possible stock market bubbles. The dynamic adjustments captured by the β terms act as an exogenous constraint on how quickly the players can deploy (or withdraw) the infrastructure. If all β terms are equal to -1, then all adjustment happens in one period, and the equations (1)–(3) become fully static. If, however, the β terms are between 0 and -1, the best response involves gradual changes to infrastructure over multiple periods, whereas the long-term level is given by the current level divided by $-\beta^{I}$ ($-\beta^{E}$) in the case of the incumbent (entrant). Moreover, we allow the regulation to follow a similar adjustment process as the infrastructure level while bearing in mind that a gradual adjustment to the regulatory intensity may be easier to facilitate than a drastic change.[22]

The aforementioned structural equations (1)–(3) can be thought of as linearized first-order conditions of a static investment game between the operators and the national regulator. In this game, each operator and regulator chooses simultaneously the level of infrastructure and regulation, respectively, as a best response to the choices of other players. The identification of coefficients on the endogenous variables in equations (1)–(3) is achieved through a set of exclusion restrictions. As described above, in each of the three equations we include that equation's own lagged dependent variables but not the lagged dependent variables

[21] That all dependent variables are in differences enables us to interpret the infrastructure equations as investment equations. This specification is equivalent to the one with levels (or stocks) as the dependent variable.

[22] Alternatively, one could postulate that investment reacts to regulation with a lag. Moreover, investment may vary with changes in regulatory policy as opposed to the level of regulation. To test these specifications, we reestimated our model with these two different functional specifications, and our results were not rejected by them. We do not report the estimation results of these alternative specifications but will provide them on request.

from the other equations. Moreover, we put further restrictions on the control variables in vectors $\boldsymbol{X}^{R}$, $\boldsymbol{X}^{I}$, and $\boldsymbol{X}^{E}$. More details on the exclusion restrictions follow in Section 5.

Finally, note that we include both lagged dependent variable and country-specific effects. Consistent estimation of our equations requires panel data with a sufficiently long time dimension. Because Monte Carlo simulations of a dynamic panel data model such as ours indicate that our sample size might not be sufficiently large (Judson and Owen 1999), we investigate the potential bias by applying a corrected estimator (Kiviet 1995; Bruno 2005).

4. Data, Descriptive Results, and Instruments

The data used in our estimations covers more than 70 fixed-line telecom operators in 20 EU member states during 1997–2006.[23] Our sample thus spans a period from before the official liberalization of the European telecommunications market on January 1, 1998, until the successful implementation of the EU telecommunications regulatory framework by all member states.[24] The Amadeus database is the main source of firm-level accounting data used to calculate the stock of infrastructure,[25] and Plaut Economics (Zehnhäusern et al. 2007) is the source of the regulation index. Additional data sources include the Osiris database, the World Bank's World Development Indicators database, and the Manifesto Project database[26] (Klingemann et al. 2006). Table 1 summarizes the variable definitions and identifies the sources. Descriptive statistics are reported in Table 2.

For infrastructure stock, we will use firms' tangible fixed assets deflated by the producer price index (PPI) for telecom equipment. This allows us to calculate infrastructure investments as the year-to-year change in stocks. Tangible fixed assets include land, buildings, plants, machinery, and equipment and therefore constitute a rather broad measure of infrastructure.[27] While other studies use

[23] The following countries (EU15) are in our data set: Austria, Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Portugal, Sweden, and the United Kingdom. The data set also includes the following EU12 countries (new member states after the 2004 and 2007 accessions): Bulgaria, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, and Slovenia.

[24] The eleventh report on the implementation of the telecommunications regulatory framework was the first to state that member states have done most of the necessary work to implement the framework (Communication from the Commission, European Electronic Communication Regulation and Markets 2005, COM [2006] 68 final [February 20, 2006]).

[25] Bureau van Dijk, Amadeus (http://www.bvdinfo.com/Products/Company-Information/International/Amadeus).

[26] Bureau van Dijk, Osiris (http://www.bvdinfo.com/Products/Company-Information/International/Osiris); World Bank, World Development Indicators (http://data.worldbank.org/data-catalog/world-development-indicators); WZB, Manifesto Project (https://manifesto-project.wzb.eu).

[27] Another issue is that of mergers and acquisitions (M&As), which represent a change in asset ownership rather than new infrastructure investment. To check robustness, we include in our estimation data on firms' M&A activity from the SDC Platinum M&A database (Thomson Reuters, SDC Platinum [http://thomsonreuters.com/products_services/financial/financial_products/a-z/sdc]). Given that the M&A variable is not significant in these estimations, we do not report the results but will provide them on request.

Table 1
Description of Variables

Variable	Description	Source
IncInf	Incumbent's infrastructure stock measured as tangible fixed assets (year 2000 € millions)	Amadeus, Osiris
EntInf	Entrant's infrastructure stock measured as tangible fixed assets (year 2000 € millions)	Amadeus, Osiris
ΣEntInf	Total (aggregated at the national level) entrants' infrastructure stock measured as tangible fixed assets (year 2000 € millions)	Amadeus, Osiris
Reg	Index of access regulation intensity; higher values indicate higher intensity of regulation	Plaut Economics
NoEnt	Dummy variable set equal to one if there are no entrants in the market and zero otherwise	Amadeus, Osiris
GDP	Per capita gross domestic product (year 2000 €)	World Bank's WDI
RegNeighbor	Average index of access regulation intensity in neighboring markets	Plaut Economics
Gov	Government's attitude toward regulation; higher values indicate more favorable position	Manifesto Project
Rile	Government's ideological position on the right-left scale; higher values indicate more right-wing position	Manifesto Project
Europe	Government's attitude toward European integration; higher values indicate more favorable position	Manifesto Project

Sources. Bureau van Dijk, Amadeus (http://www.bvdinfo.com/Products/Company-Information/International/Amadeus; Bureau van Dijk, Osiris (http://www.bvdinfo.com/Products/Company-Information/International/Osiris); Plaut Economics (Zehnhäusern et al. 2007); World Bank, World Development Indicators (WDI) database (http://data.worldbank.org/data-catalog/world-development-indicators); WZB, Manifesto Project (https://manifesto-project.wzb.eu).

transmission lines as means of measuring infrastructure (Chang, Koski, and Majumdar 2003; Crandal, Ingraham, and Singer 2004), the advantage of our measure is that it allows us to study the strategic behavior of both the incumbents and the entrants in a number of geographic markets over a long period. Our infrastructure measure corresponds to the geographic markets, which we define as EU member states, and operators with multinational presence. With only a few exceptions, the tangible fixed assets that we measure are from the fixed-line segment of the telecommunications markets.[28] The list of operators in our sample, together with a detailed description of how the infrastructure measure was broken down to match the geographic and the product markets, is reported in the Appendix. The average stock of incumbents' and entrants' telecom infrastructure and the average number of entrants across time are shown in Figure 1.

The regulation variables in our analysis are from Plaut Economics (Zehnhäusern et al. 2007). The Plaut regulatory index provides detailed, comprehensive information on different regulatory measures in the telecom sector for all 27 EU countries during 1997–2006. We use five subindices related to access to

[28] In 10 of more than 70 cases, we were not able to separate the operator's fixed-line network from the mobile telephone infrastructure. Country-specific fixed effects, which we use in all equations, control for this omission to some extent.

Table 2
Descriptive Statistics

Variable	Mean	SD	Min	Max
IncInf	2,350.1	3,597.1	.051	19,787.3
EntInf	140.0	250.8	.010	1,563.9
ΣEntInf	462.6	1,020.0	0	7,008.4
Reg	.45	.29	.14	.86
NoEnt	.24	.43	0	1
GDP	12,425.4	8,379.9	1,415.2	29,067.0
RegNeighbor	.44	.26	.14	.78
Gov	1.50	1.14	0	4.47
Rile	3.94	9.19	−12.65	28.47
Europe	1.98	1.56	−.78	6.25

incumbents' infrastructure—specifically, the existence of accounting separation obligation, regulation regarding full unbundling, line sharing, bitstream access, and subloop unbundling of fixed-line incumbents' local loops.[29] Our measure of access regulation intensity is then an average of these binary subindices that reflects the extent of mandated sharing of incumbents' infrastructure.

Figure 2 shows the development of all five subindices that enter our measure of access regulation over the sample period. The EU average of each of the five subindices reflecting the share of EU countries that adopted each of the regulatory measures is shown on the vertical axis. Accounting separation is the most widely adopted measure, especially in the early years. This is intuitive because an appropriate cost-accounting system is necessary to support price controls of access to an incumbent's infrastructure.[30] The other four regulatory measures grant access to entrants at various levels of the incumbent's infrastructure. At one extreme, full unbundling gives entrants full control of the local loop. In particular, it allows for voice service and, after upgrading, broadband service via DSL technology to be offered. At the other extreme, bitstream access allows entrants to offer broadband service via local loops upgraded by the incumbent. Line sharing is an intermediate measure in that it gives entrants access to the part of the local loop's spectrum that can be used for broadband, but entrants need to install the necessary upgrade themselves, and subloop unbundling means that only the last part of the local loop is unbundled. Figure 2 suggests that capital-intensive access measures (full unbundling and line sharing) are typically introduced earlier than less capital intensive bitstream access. This pattern is confirmed in the individual

[29] The indicators that enter our regulatory index for the fixed-line segment correspond to keys 12 through 16 of the Plaut index.

[30] The mandated access charges in Europe were established by national regulators, and the detailed rules varied from country to country. However, the overarching principle was the method of cost recovery allowing a reasonable rent on capital employed (Council Directive 2002/19/EC, Access to, and Interconnection of, Electronic Communications Networks and Associated Facilities, 2002 O.J. [L 108] 7–17)—that is, the rate-of-return regulation—which is in contrast to situation in the United States, where a particular form of incentive regulation (total element long-run incremental cost, or TELRIC) was imposed.

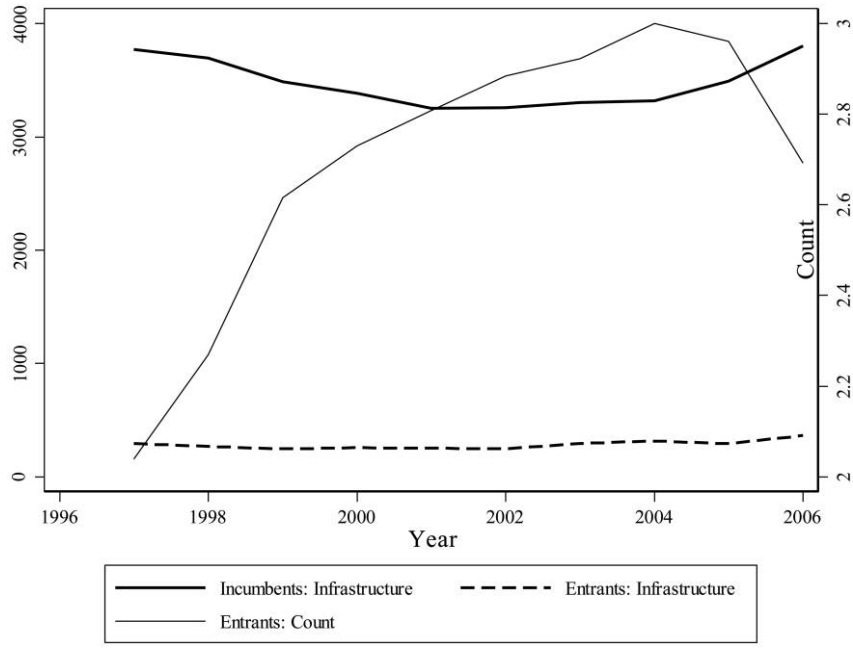


Figure 1. The average stock of fixed-line telecom infrastructure and the average number of entrants per European Union member state in the sample.

country data: only two European countries (Belgium and Spain) phased in the regulatory measures in the opposite order, and two others (France and the United Kingdom) introduced them simultaneously. Thus, an increasing overall measure of access regulation comprising these five measures can be interpreted as rendering entry easier, because it allows national regulators to set better informed cost-based access charges, it allows entrants to pick and choose an optimal level of access that is based on demand and the cost of infrastructure, and it allows for less infrastructure investment per connected customer.

Figure 3 reports the evolution of regulation in the European telecom sector, as represented in our analysis, over the past 10 years. Whereas the old EU member states (EU15) experienced growing regulatory intensity in the fixed-line segment, which leveled off in 2002, no substantial measures to promote entry into fixed-line telephony were introduced in the new member states (EU12) until the eve of the 2004 EU accession. Because it will be used for the construction of the geographical instruments, the distinction between EU15 and EU12 is important to keep in mind.

Tables 1 and 2 also present the control variables used in equations (1)–(3). Gross domestic product per capita is included in our estimations to control for

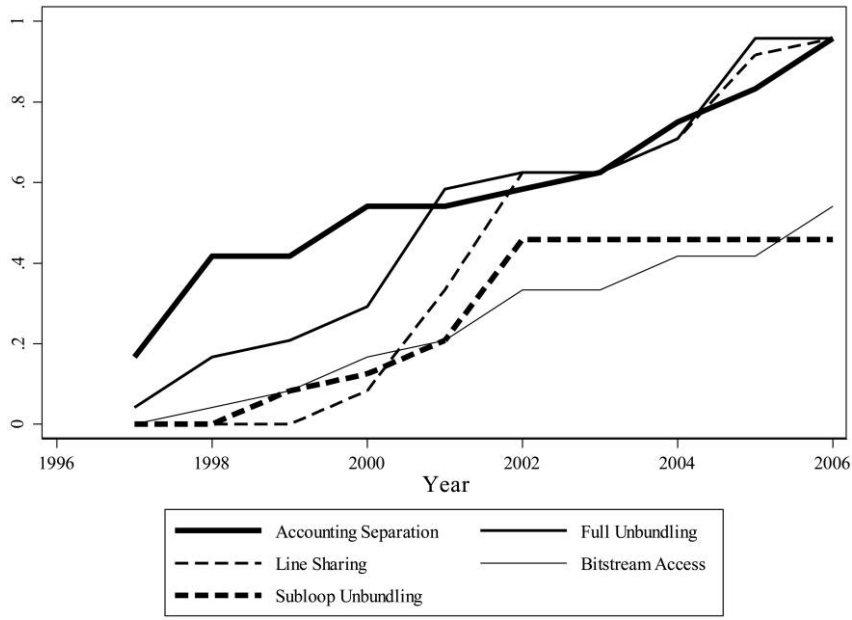


Figure 2. Subindices of access regulation in European Union fixed-line telecom markets.

changes in demand for telecommunication services. The no-entry indicator (NoEnt) equals one when there is no entrant infrastructure in a given market. Otherwise, it equals zero. The term NoEnt picks up any effects when infrastructure stock equals zero.[31]

The other control variables characterize aspects of national access regulation. The term RegNeighbor is a geographical instrument that captures the average level of entry regulation in neighboring markets. Our definition of neighbor is not geographical but rather relates to belonging to the same cohort (EU15 or EU12), given that the level of regulation varies substantially between these two groups (Figure 2). Consequently, because Germany and Poland belong to different cohorts (EU15 and EU12, respectively), they do not constitute neighboring markets even though they are contiguous geographic neighbors. Variables based on party manifestos to measure political positions of governments include overall policy positions of governments in terms of right versus left (Rile), favoring market regulation and government presence in markets (Gov), and attitude

[31] It also helps us to estimate equations (1)–(3) in logs, as we do not have to drop observations. When entrants' infrastructure stock equals zero, we set entrants' infrastructure at the smallest positive value in the sample.

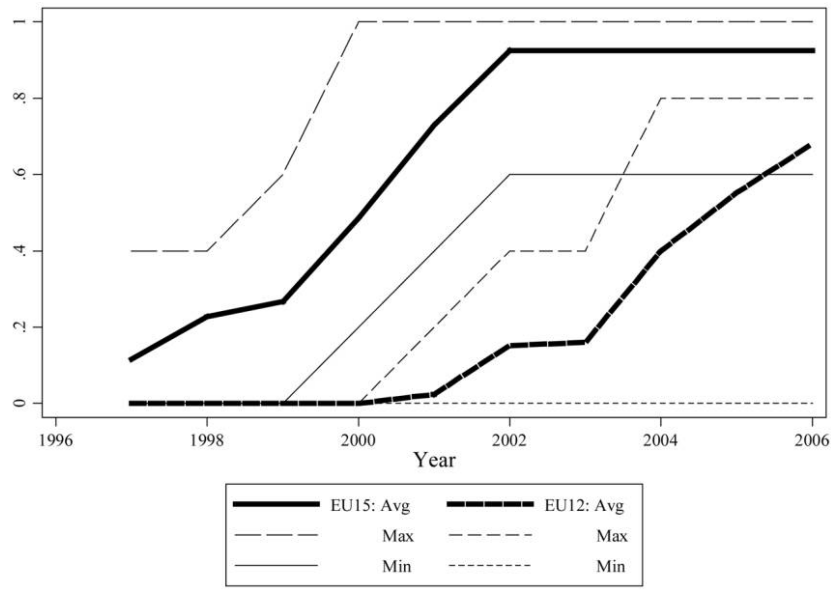


Figure 3. Index of access regulation in European Union (EU) fixed-line telecom markets: the 15 old EU states (EU15) versus the 12 new EU states (EU12).

toward European integration (Europe).[32] We do not have any priors regarding the government's overall policy position, but we expect governments that favor regulation and European integration to be more inclined to implement mandated sharing of telecom infrastructure as prescribed in the EU regulatory framework. We also expect regulation to be spurred by developments in neighboring markets that exert pressure on national regulators. In other words, we expect to see a regulatory catching-up effect among the member states.

5. Empirical Results

We estimate equations (1)–(3) by first using ordinary least squares (OLS) and then instrumental variables (IV) methods. In each equation, all explanatory variables of the model are used as instruments. The OLS and IV results are reported in Tables 3 and 4, respectively. Country dummies (α_i terms) and year dummies (λ_t terms) are not reported, for brevity.

The identification of coefficients on the endogenous variables in equations

[32] Government's position is defined as the weighted average score of parties in the government, with the weights being determined by the proportion of parliamentary seats held by each party. In election years, government position is taken as the average position of two consecutive governments weighted by number of months in office.

Table 3
Ordinary Least Squares Estimation Results

	Regulation	Incumbent	Entrants
Dependent variable	ΔReg_t	$\Delta \log(IncInf_t)$	$\Delta \log(\Sigma EntInf_t)$
Dynamic effects:			
Reg_{t-1}	−.689** (.090)		
$\log(IncInf_{t-1})$		−.716** (.132)	
$\log(\Sigma EntInf_{t-1})$			−.794** (.081)
Simultaneity:			
Reg_t		−.094 (.192)	.479 (.342)
$\log(IncInf_t)$	.033** (.013)		−.186* (.082)
$\log(\Sigma EntInf_t)$	−.004 (.009)	.034 (.036)	
Controls:			
$NoEnt_t$	.031 (.075)	−.068 (.325)	−7.088** (.914)
$\log(GDP_t)$	−.208* (.099)	.068 (.404)	−.581 (.541)
$RegNeighbor_t$	.669** (.111)		
Gov_t	−.073** (.023)		
$Rile_t$	.004** (.001)		
$Europe_t$	.019 (.012)		
N	120	129	139
Serial correlation	.04	.33	−.03

Note. Robust standard errors are in parentheses. Coefficients on country and year dummies are not reported.
* Significant at the 5% level.
** Significant at the 1% level.

(1)–(3) rests on a set of exclusionary restrictions. First, as can be read from Table 4, all three endogenous variables are assumed to depend on their own lagged levels but not on the lagged levels of other endogenous variables. As indicated previously, the lagged levels of the dependent variables are meant to capture the exogenous constraint on the speed with which the best response investment can be achieved. This assumption is consistent with the static nature of the game played between the regulator and the firms that we consider. Second, we assume that the set of political variables, Rile, Gov, and Europe, and the extent of regulation in neighboring markets, RegNeighbor, directly affect domestic regulation but are not related to the domestic investment in the telecom infrastructure.

We perform a number of specification tests, including testing exogeneity and the strength of our instruments in the IV regressions. As reported in Table 4, Hansen *J*-statistics are insignificant, which suggests that the overidentifying restrictions are valid.[33] The regressions-based tests (Wooldridge 2002, p. 176) accept no serial correlation in the error term, which is important for the consistency of our estimates, as we have lagged dependent variables in the model and use as instruments, among others, lagged values of endogenous variables. Finally, *F*-tests for our instruments in the first-stage regressions (not reported) are significant at the 1 percent level for all endogenized variables, with the exception of

[33] Regulation equation (1) is exactly identified, so the Hansen *J*-statistic cannot be computed.

Table 4
Instrumental Variable Estimation Results

	Regulation		Incumbent		Entrants	
Dependent variable	ΔReg_t		$\Delta \log(IncInf_t)$		$\Delta \log(\Sigma EntInf_t)$	
Dynamic effects:						
Reg_{t-1}	−.685**	(.094)				
$\log(IncInf_{t-1})$			−.676**	(.149)		
$\log(\Sigma EntInf_{t-1})$					−.817**	(.080)
Simultaneity:						
Reg_t			−.975*	(.458)	1.195+	(.634)
$\log(IncInf_t)$	.157*	(.076)			−.407	(.433)
$\log(\Sigma EntInf_t)$	−.002	(.021)	.179+	(.098)		
Controls:						
$NoEnt_t$	.084	(.165)	1.172	(.798)	−7.351**	(1.024)
$\log(GDP_t)$	−.182	(.148)	−.360	(.650)	−.300	(.743)
$RegNeighbor_t$	.661**	(.125)				
Gov_t	−.080**	(.024)				
$Rile_t$	.002	(.002)				
$Europe_t$	.032*	(.015)				
N	110		110		110	
Hansen *J*			3.42	(3)	4.26	(3)
Serial correlation	−.03		.12		−.18	

Note. Robust standard errors are in parentheses. Coefficients on country and year dummies are not reported.
+ Significant at the 10% level.
* Significant at the 5% level.
** Significant at the 1% level.

incumbent infrastructure, for which the test is significant at the 14 percent level. These test results support our instruments, albeit somewhat more weakly for the incumbent infrastructure variable.[34]

We also test for endogeneity of regulation and investment decisions, a crucial part of the analysis often absent from previous studies. Comparing the OLS to the IV estimates reveals significant differences in the coefficient estimates (see Tables 3 and 4). A Hausman specification test rejects that the difference in coefficients is not systematic at the 1 percent confidence level for equations (1)–(3), confirming that endogeneity matters empirically. As can be seen in Table 3, if we do not account for endogeneity of regulation, we find no significant impact of regulation on investment, whereas if we allow regulation to be endogenously determined by level of infrastructure investment, we find a significant effect (Table 4). In sum, investment in regulated network industries is subject to significant endogeneity bias that must be accounted for to understand the relationship between access regulation and investment.[35]

[34] Results of the first-stage regressions are available from the authors on request.

[35] We also tested, using ordinary least squares regressions, the bias of estimating the dynamic panel data model with fixed effects (also referred to as the least-squares dummy variable [LSDV]). Applying a corrected LSDV estimation (Kiviet 1995; Bruno 2005), we found little difference from our estimates; coefficients on the lagged dependent variable were slightly lower in magnitude, and the other coefficients were virtually unchanged (these results are available on request). We therefore conclude

A number of interesting insights emerge from a review of the estimates in Table 4. One is the importance of dynamic adjustment effects, because the lagged infrastructure and regulation variables are statistically significant and economically relevant, which suggests that there are both short-term and long-term effects: a short-term adjustment of infrastructure levels will be followed by future adjustments until the desired level of infrastructure is reached. It is interesting to note that there is also evidence of a dynamic regulatory process—that is, with regulatory changes occurring as a gradual process rather than as a one-shot affair.

The estimates of equation (1) presented in Table 4 imply that regulators do respond to investment by firms, as regulation increases in the stock of incumbents' infrastructure (γ^R is positive). This finding suggests that regulators are subject to a commitment problem: when the level of incumbents' infrastructure stock is high, national regulators tend to grant easier access, which is a disincentive for incumbents to invest in the first place.[36] Regulatory intensity is not affected, however, by entrants' infrastructure stock (δ^R is insignificant). We thus find evidence in our data that regulators respond quite differently to incumbents' and entrants' infrastructure investments.[37]

The results of equations (2) and (3), presented in Table 4, indicate that the effect of regulation on the investment decisions of incumbents and entrants is quite different. Controlling for endogeneity, we find that an increase in regulatory intensity decreases incumbents' investment but increases total investment across entrants. To be specific, our estimate suggests that increasing regulatory intensity by .5, which roughly corresponds to the average change in the regulatory regime in EU15 between 1997 and 2002, reduces incumbents' infrastructure stock by approximately 49 percent, and by as much as 72 percent in the long run.[38,39] The same change in regulation increases entrants' total infrastructure stock by approximately 60 percent, and by as much as 73 percent in the long run. These results suggest that the impact of regulatory intensity on investment is signifi-

---

that the endogeneity bias is much more important and ignore the other bias. In doing so, we might underestimate the long-term effects of explanatory variables in our model.

[36] Note that we interpret our findings along the time-series dimension because all equations that we estimate include country-specific fixed effects. Hence, a possible effect that national authorities impose more stringent access regulation on large, rather than growing, incumbents is then absorbed by the fixed effects.

[37] Moreover, we test whether regulation depends positively on the gap between incumbents' and entrants' infrastructure levels. This hypothesis can be formulated as $(\gamma^R - \delta^R)/2 > 0$. Using the estimates on standard errors in Table 4, we do not reject the gap hypothesis at the 10 percent level. One possible drawback of our regulatory index is that it aggregates the five regulatory measures symmetrically. To address this issue to some extent, we reestimated our model, including each of the five regulatory measures separately. The individual results for the five submeasures are in line with all our main findings from the aggregate model, albeit slightly less so in the case of accounting separation. These results are available on request.

[38] With the dependent variable in logarithms, the effect is in percentages.

[39] Recall that the long-term effect of an increase in regulation on incumbents' infrastructure stock can be calculated from equation (2) as $-\delta^I/\beta^I$, which is $-.4875/.676 \approx .72$.

cantly different for incumbents and entrants, which confirms the validity of our empirical approach of treating incumbents and entrants differently.[40,41]

Taking this a step further, we note that in Table 4 the impact of entrants on incumbents' infrastructure investments is positive (γ^I is estimated at .179 and is significant at the 10 percent level), which indicates that the respective investments are strategic complements. In other words, when entrants invest more, so do incumbents. This strategic effect reduces the negative impact of regulation on investment incentives. The estimates in Table 4 further suggest that although tighter regulation has a direct negative effect on incumbents' investment incentives, it also increases entrants' infrastructure investment, which in turn has a positive impact on incumbents' investment through strategic complementarity.[42] Taking this into account, we find that increasing the regulation index by .5 reduces incumbents' infrastructure stock by approximately 47 percent over the long term. In other words, the negative impact of regulation on incumbent's investment incentives is only partially compensated by strategic complementarity. On the other hand, the strategic effect boosts investment by entrants. Although not statistically significant, the strategic effect increases entrants' infrastructure investment to 96 percent over the long term. In terms of monetary impact, the additional 96 percent of entrants' infrastructure stock and 47 percent loss of incumbents' infrastructure stock correspond to €444 million and €1.1 billion per EU member state, respectively.[43] This adds up to some €16.4 billion in lost infrastructure investment for the European Union as a whole, which corresponds to almost 23 percent of the infrastructure stock.

An important assumption is that we abstract from cable competition to focus on telecom operators, despite the fact that cable companies have penetration rates in excess of 50 percent in some countries in our sample and have proved to be a vibrant source of telephone competition in some countries, including the United States. To test this assumption, we followed two approaches. First, to test whether cable has an impact on our estimates, we add the national shares of households covered by cable. Second, we exclude EU countries with a cable

[40] To test whether the same regulatory index results in significantly different prices across countries, we reestimated our model incorporating LLU rates. The following specifications were estimated: (1) to test whether LLU prices change the effect of Reg, we add the LLU rate as well as an interaction term between Reg and LLU, and (2) we vary the coefficient on Reg by interacting Reg with a dummy denoted LLU_high, which indicates whether the LLU rental rate is above the sample average. The resulting estimates for the LLU variables turned out not to be significant in either specification, thus suggesting that the implementation of the various access requirements in terms of prices do not vary across the EU to the extent that our main results are affected. The detailed results are available on request.

[41] Table 2 suggests differences in the scale at which the firms operate, which could have an effect of regulation on investment (and vice versa). To test this, we reestimated our model, including an interactive term of the regulatory index with the incumbent's and entrants' infrastructures. The interaction terms turned out not to be statistically significant. It thus does not appear that our results are driven by scale effects as measured by infrastructure. The detailed results are available on request.

[42] Note that strategic complementarity does not work the other way around—that is, from incumbents to entrants (γ^E is negative and not significant).

[43] This is calculated at the sample mean, assuming that regulation is exogenous.

share of broadband in excess of 30 percent in 2006. Note that under the assumption that cable reflects investment targeting TV rather than the telecom services, this variable is exogenous in our model, which justifies using it as a control. The estimation results of the first approach indicate that cable had no significant effect in either of the equations and did not significantly change any of the other parameter estimates. With regard to the second approach, our main results were not significantly changed either, although the statistical significance was lower because of the restricted sample size. In sum, we maintain that cable competition does not significantly alter the outcomes in the European telecom markets.[44]

Finally, the impact of the control variables is generally as expected. In Table 4, regulation in neighboring markets, RegNeighbor, has a significant impact on national regulation, which reflects regulatory catching up in the EU. A positive attitude of government toward European integration, Europe, increases regulatory intensity in a given national market, whereas the government attitude toward regulation, Gov, has, somewhat surprisingly, a significant negative impact. One explanation for the latter finding is that Gov measures attitude toward old-style regulation of monopoly markets. Governments' attitude toward access regulation in telecommunications markets might be quite different, even opposite, because it emphasizes generating competition within the market. Governments' ideological position, Rile, and gross domestic product are significant in the OLS estimation (Table 3) but not in the IV estimation. Finally, the negative coefficient on NoEnt in the entrants' equation (3) controls for zero infrastructure levels.

Note that we have thus far investigated only the impact of access regulation on total investment summed over entrants, not the extent to which regulation affects entrants' individual investments. An increase in total infrastructure investment could obviously be due to greater numbers of entrants, larger investments by individual entrants, or both. Examining individual investments sheds light on facilities-based versus service-based entry. Because facilities-based entry is likely to involve substantially more investment, less investment per entrant would be expected in the case of service-based entry. To test for this in our data, we estimate equation (3) at the firm level as follows:[45]

$$\begin{aligned}\Delta\mathrm{EntInf}_{j,i,t} = {} & \alpha_i^{\mathrm{E}} + \lambda_t^{\mathrm{E}} + \beta^{\mathrm{E}}\mathrm{EntInf}_{j,i,t-1} + \gamma^{\mathrm{E}}\mathrm{IncInf}_{i,t} \\ & + \delta^{\mathrm{E}}\mathrm{Reg}_{i,t} + \mathbf{X}_{i,t}^{\mathrm{E}}\boldsymbol{\theta}^{\mathrm{E}} + \xi_{j,i,t},\end{aligned} \tag{3'}$$

where $\Delta\mathrm{EntInf}_{j,i,t}$ denotes infrastructure investment by individual entrants j in market i at time t. The results of reestimating equation (3′) using OLS and IV regressions are reported in Table 5. As can be seen, the Hansen J-statistic does not reject exogeneity of the instruments; the Hausman specification test (not reported) suggests that the difference in coefficients is systematic.

[44] These results are available on request.

[45] Unfortunately, no data broken down by facilities-based versus service-based infrastructure investment are available.

Table 5
Estimation Results for Individual Entrants, by Regression Method Used

	OLS	IV
Dynamic effects:		
Reg_{t-1}		
$\log(IncInf_{t-1})$		
$\log(EntInf_{t-1})$	−.075* (.030)	−.078* (.032)
Simultaneity:		
Reg_t	−.935^{+} (.556)	−1.942^{+} (1.103)
$\log(IncInf_t)$	−.115 (.230)	−1.492^{+} (.883)
$\log(\Sigma EntInf_t)$		
Controls:		
$NoEnt_t$		
$\log(GDP_t)$	.672 (.799)	.699 (1.252)
$RegNeighbor_t$		
Gov_t		
$Rile_t$		
$Europe_t$		
N	237	192
Hansen *J*		4.97 (4)
Serial correlation	.01	.05

Note. The dependent variable is $\Delta\log(EntInf_t)$. Robust standard errors are in parentheses. Coefficients on country and year dummies are not reported. OLS = ordinary least squares; IV = instrumental variables.
$^{+}$ Significant at the 10% level.
* Significant at the 5% level.

Comparing the coefficients' estimates of equations (3) and (3′), we see that most results remain unchanged.[46] The estimated coefficient on the lagged dependent variable is negative and highly significant as well as much smaller than that in Table 4, which suggests that the dynamics are more persistent at the individual entrant level than at the market level. As before, incumbent infrastructure has a negative impact on entrants, although it is now significant in the IV estimation (γ^E is estimated at −1.492 and is significant at the 10 percent level). More important, however, the impact of regulation on an individual entrant's investment is negative (although statistically significant only at the 10 percent level), which suggests that entrants' total investment increases even as investment by individual entrants declines with regulation that eases access. In other words, easier access pushes entrants toward service-based competition.[47] This finding is consistent with the view that the EU regulatory framework is not providing effective incentives to move toward facilities-based competition.

[46] We also tested the strategic interactions between entrants by including total entrants' stock of infrastructure in the disaggregated equation (3′). That this variable turned out never to be significant corroborates our assumptions. The results are available on request.

[47] This result is consistent with Friederiszick, Grajek, and Röller (2008), which estimates a similar model without the strategic effects.

6. Conclusion

This paper investigates the trade-off faced by regulators promoting market entry and static efficiency by means of regulated access and not undermining incentives to invest in infrastructure. It provides empirical evidence of this inherent trade-off between access regulation and investment incentives in network industries by differentiating between incumbents and entrants and permitting regulation to be endogenous.

We find considerable support for our approach. In particular, regulation has a quite different impact on the investment decisions of incumbents and entrants, discouraging investment by incumbents and individual entrants even as entrants' total investment increases. We find that an endogenous treatment of regulation drives these results.

These findings cast doubt on the EU regulatory environment with respect to moving toward facilities-based competition in telecommunications. Our results suggest that regulation discourages entrants' individual investment even as entry and total investment by entrants increases. Because facilities-based entry is likely to require substantial firm-level investment, our results are consistent with the view that the regulatory framework in Europe fails to deliver effective incentives to move toward facilities-based competition.

Finally, we find regulatory responses to infrastructure investments to differ between incumbents and entrants. Whereas access regulation is not affected by entrants' investment, we find that regulators respond to higher infrastructure investment by incumbents by providing easier access, thereby undermining incumbents' incentives to invest in infrastructure in the first place. This finding suggests that the regulatory environment in Europe is subject to a regulatory commitment problem.

Appendix

The Construction of the Infrastructure Variable

Table A1 contains the list of operators in our sample and details on the construction of our infrastructure variable. In general, our measure of infrastructure is domestic tangible fixed assets in the fixed-line business of each operator. In most cases, we can read this measure directly from our data ("directly measured" in Table A1). Some incumbent telecom operators, however, do not break down this measure according to the regions of operation (EU member states) and/or the function (fixed line versus mobile). To tackle these problems, we computed the infrastructure measure by (1) taking the ratio of tangible fixed assets to total assets in all markets where a given operator is active and applying this ratio to the total assets in a given member state to compute the member-state-specific tangible fixed assets ("geographic approximation" in Table A1) and/or (2) subtracting the tangible fixed assets of the mobile subsidiary from the operator's total tangible fixed assets ("functional approximation" in Table A1).

In a few cases, we were not able to perform the functional approximation and hence the infrastructure measure includes both the fixed-line and the mobile infrastructures ("no functional breakdown" in Table A1).

Table A1
Construction of Infrastructure Measure for Operators in the Sample

Country	Company	Incumbent	Infrastructure	Data Source
Austria	Telekom Austria	Yes	Geographic and functional approximation	Amadeus, Osiris
Belgium	Belgacom	Yes	Functional approximation	Amadeus, Osiris
Belgium	Colt Telecom	No	Directly measured	Amadeus
Belgium	Scarlet Telecom	No	Directly measured	Amadeus
Belgium	Tele 2	No	Directly measured	Amadeus
Belgium	Telenet	No	Directly measured	Amadeus
Belgium	Verizon	No	Directly measured	Amadeus
Belgium	Versatel	No	Directly measured	Amadeus
Bulgaria	Bulgarian Telecom	Yes	No functional breakdown	Amadeus
Denmark	TDC	Yes	Functional approximation	Amadeus
Denmark	Colt Telecom	No	Directly measured	Amadeus
Denmark	Tele2	No	Directly measured	Amadeus
Denmark	Verizon	No	Directly measured	Amadeus
Estonia	Elion Ettevõtted	Yes	Directly measured	Amadeus
Estonia	Tele2	No	Directly measured	Amadeus
France	France Telecom	Yes	Functional approximation	Amadeus, Osiris
France	BT C & SI	No	Directly measured	Amadeus
France	Colt Telecom	No	Directly measured	Amadeus
France	Intercall	No	Directly measured	Amadeus, Osiris
France	Neuf Cegetel	No	Directly measured	Amadeus, Osiris
France	Telecom Italia	No	Directly measured	Amadeus
France	Telemedia	No	Directly measured	Amadeus
France	Tiscali	No	Directly measured	Amadeus
France	Verizon	No	Directly measured	Amadeus
Germany	Deutsche Telekom	Yes	Geographic and functional approximation	Amadeus, Osiris
Germany	3U Telecom	No	Directly measured	Amadeus
Germany	Arcor	No	Directly measured	Amadeus
Germany	Freenet	No	Directly measured	Amadeus
Germany	Tiscali	No	Directly measured	Amadeus
Germany	Versatel	No	Directly measured	Amadeus
Greece	OTE Globe	Yes	Directly measured	Amadeus
Greece	Forthnet	No	Directly measured	Amadeus
Greece	Hellas On Line	No	Directly measured	Amadeus
Greece	Newsphone	No	Directly measured	Amadeus
Greece	Verizon	No	Directly measured	Amadeus
Hungary	Magyar Telekom	Yes	No functional breakdown	Amadeus
Hungary	Hungarotel	No	Directly measured	Amadeus
Hungary	Invitel	No	Directly measured	Amadeus
Hungary	UPC	No	Directly measured	Amadeus
Ireland	Eircom	Yes	No functional breakdown	Amadeus, Osiris
Ireland	BT	No	Directly measured	Amadeus

Table A1 (*Continued*)

Country	Company	Incumbent	Infrastructure	Data Source
Ireland	Colt Telecom	No	Directly measured	Amadeus
Ireland	Energis	No	Directly measured	Amadeus
Italy	Telecom Italia	Yes	Directly measured	Amadeus
Italy	Fastweb	No	Directly measured	Amadeus
Italy	Tele2	No	Directly measured	Amadeus
Italy	Tiscali	No	Directly measured	Amadeus
Italy	Wind	No	Directly measured	Amadeus
Latvia	Lattelecom	Yes	Directly measured	Amadeus
Latvia	Telekom Baltija	No	Directly measured	Amadeus
Latvia	Telekomunikaciju Grupa	No	Directly measured	Amadeus
Lithuania	Lietuvos Telekomas	Yes	No functional breakdown	Amadeus
Lithuania	TEO	No	Directly measured	Amadeus, Osiris
Malta	Maltacom	Yes	No functional breakdown	Amadeus
Poland	Telekomuni-Kacja Polska	Yes	No functional breakdown	Amadeus, Osiris
Poland	Netia	No	Directly measured	Amadeus, Osiris
Poland	Tele2	No	Directly measured	Amadeus
Portugal	PT Comunicaçoes	Yes	Directly measured	Amadeus
Portugal	Novis Telecom	No	Directly measured	Amadeus
Romania	Romtelecom	Yes	No functional breakdown	Amadeus
Romania	UPC	No	Directly measured	Amadeus
Slovenia	Telekom Slovenije	Yes	No functional breakdown	Amadeus
Sweden	Teliasonera Sverige	Yes	Directly measured	Amadeus
Sweden	Tele2	No	Directly measured	Amadeus
Sweden	Telenor	No	Directly measured	Amadeus
Sweden	Verizon	No	Directly measured	Amadeus
United Kingdom	BT	Yes	Geographic approximation	Amadeus, Osiris
United Kingdom	Adept Telecom	No	Directly measured	Amadeus, Osiris
United Kingdom	Alternative Networks	No	Directly measured	Amadeus, Osiris
United Kingdom	Colt	No	Directly measured	Amadeus
United Kingdom	Kingston	No	Directly measured	Amadeus
United Kingdom	NTL	No	Directly measured	Amadeus
United Kingdom	Pipex	No	Directly measured	Amadeus
United Kingdom	PNC Telecom	No	Directly measured	Amadeus, Osiris
United Kingdom	Telecom Plus	No	Directly measured	Amadeus
United Kingdom	THUS	No	Directly measured	Amadeus
United Kingdom	Vanco	No	Directly measured	Amadeus

Sources. Bureau van Dijk, Amadeus (http://www.bvdinfo.com/Products/Company-Information/International/Amadeus; Bureau van Dijk, Osiris (http://www.bvdinfo.com/Products/Company-Information/International/Osiris).

References

Alesina, Alberto, Silvia Ardagana, Giorgio Nicoletti, and Fabio Schiantarelli. 2005. Regulation and Investment. *Journal of the European Economic Association* 3:791–825.

Armstrong, Mark. 2002. The Theory of Access Pricing and Interconnection. Pp. 22–24 in vol. 1 of *Handbook of Telecommunications Economics.* edited by Martin Cave, Sumit K. Majumdar, and Ingo Vogelsang. London and New York: Elsevier.

Armstrong, Mark, Chris Doyle, and John Vickers. 1996. The Access Pricing Problem: A Synthesis. *Journal of Industrial Economics* 44:131–50.

Armstrong, Mark, and David E. Sappington. 2006. Regulation, Competition, and Liberalization. *Journal of Economic Literature* 44:325–66.

Baake, Pio, Ulrich Kamecke, and Christian Wey. 2005. A Regulatory Framework for New and Emerging Markets. *Communications and Strategies* 60:123–36.

Bourreau, Marc, and Pinar Dogan. 2005. Unbundling the Local Loop. *European Economic Review* 49:173–99.

———. 2006. "Build-or-Buy" Strategies in the Local Loop. *American Economic Review* 96:72–76.

Bruno, Giovanni S. F. 2005. Approximating the Bias of the LSDV Estimator for Dynamic Unbalanced Panel Data Models. *Economic Letters* 87:361–66.

Cambini, Carlo, and Yanyang Jiang. 2009. Broadband Investment and Regulation: A Literature Review. *Telecommunications Policy* 33:559–74.

Cave, Martin. 2006a. Encouraging Infrastructure Investment via the Ladder of Investment. *Telecommunications Policy* 30:223–37.

———. 2006b. Making the Ladder of Investment Operational. Unpublished manuscript. Warwick Business School, Coventry. http://www.ictregulationtoolkit.org/en/Publication.2916.html.

Cave, Martin, and Ingo Vogelsang. 2003. How Access Pricing and Entry Interact. *Telecommunications Policy* 27:717–27.

Chang, Hsihui, Heli Koski, and Sumit K. Majumdar. 2003. Regulation and Investment Behaviour in the Telecommunications Sector: Policies and Patterns in US and Europe. *Telecommunications Policy* 27:677–99.

Crandall, Robert W. 2005. *Competition and Chaos.* Washington, D.C.: Brookings Institution Press.

Crandall, Robert W., Allan T. Ingraham, and Hal J. Singer. 2004. Do Unbundling Policies Discourage CLEC Facilities-Based Investment. *B.E. Journal of Economic Analysis and Policy* 4, art. 14, pp. 1–23.

Crandall, Robert W., and Leonard Waverman. 2006. The Failure of Competitive Entry into Fixed-Line Telecommunications: Who Is at Fault? *Journal of Competition Law and Economics* 2:113–48.

De Bijl, Paul, and Martin Peitz. 2005. Local Loop Unbundling in Europe: Experience, Prospects and Policy Challenges. *Communications and Strategies* 57:33–57.

Duso, Tomaso, and Lars-Hendrik Röller. 2003. Endogenous Deregulation: Evidence from OECD Countries. *Economic Letters* 81:67–71.

Foros, Oystein. 2004. Strategic Investments with Spillovers, Vertical Integration and Foreclosure in the Broadband Access Market. *International Journal of Industrial Organization* 22:1–24.

Freixas, Xavier, Roger Guesnerie, and Jean Tirole. 1985. Planning under Incomplete Information and the Ratchet Effect. *Review of Economic Studies* 52:173–91.

Friederiszick, Hans, Michał Grajek, and Lars-Hendrik Röller. 2008. Analyzing the Relationship between Regulation and Investment in the Telecom Sector. White Paper No. WP-108-01. European School of Management and Technology, Berlin.

Fudenberg, Drew, and Jean Tirole. 1985. Preemption and Rent Equalization in the Adoption of New Technology. *Review of Economic Studies* 52:383–401.

Gans, Joshua. 2001. Regulating Private Infrastructure Investment: Optimal Pricing for Access to Essential Facilities. *Journal of Regulatory Economics* 20:167–89.

Greenstein, Shane, and Michael Mazzeo. 2006. The Role of Differentiation Strategy in

Local Telecommunication Entry and Market Evolution: 1999–2002. *Journal of Industrial Economics* 54:323–50.
Guthrie, Graeme. 2006. Regulating Infrastructure: The Impact on Risk and Investment. *Journal of Economic Literature* 44:925–72.
Haring, John, and Jeffrey H. Rohlfs. 2002. The Disincentives for ILEC Broadband Investment Afforded by Unbundling Requirements. Unpublished manuscript. Strategic Policy Research, Inc., Bethesda, Md.
Hausman, Jerry A. 1997. Valuing the Effect of Regulation on New Services in Telecommunications. *Brookings Papers on Economic Activity: Microeconomics*, pp. 1–38.
Hausman, Jerry A., and J. Gregory Sidak. 2005. Did Mandatory Unbundling Achieve Its Purpose? Empirical Evidence from Five Countries. *Journal of Competition Law and Economics* 1:173–245.
Hellwig, Martin. 2008. Competition Policy and Sector-Specific Regulation for Network Industries. MPI Collective Goods Preprint No. 2008/29. Max Planck Institute for Research on Collective Goods, Bonn.
Höffler, Felix. 2007. Costs and Benefits from Infrastructural Competition: Estimating Welfare Effects from Broadband Access Competition. *Telecommunications Policy* 31: 401–18.
Ingraham, Allan T., and J. Gregory Sidak. 2003. Mandatory Unbundling, UNE-P, and Cost of Equity: Does TELRIC Pricing Increase Risk for Incumbent Local Exchange Carriers? *Yale Journal of Regulation* 20:389–406.
Jorde, Thomas M., J. Gregory Sidak, and David J. Teece. 2000. Innovation, Investments, and Unbundling. *Yale Journal of Regulation* 17:1–37.
Judson, Ruth A., and Ann L. Owen. 1999. Estimating Dynamic Panel Data Models: A Guide for Macroeconomists. *Economics Letters* 65:9–15.
Katz, Michael L., and Carl Shapiro. 1987. R&D Rivalry with Licensing or Imitation. *American Economic Review* 77:402-20.
Kiviet, Jan F. 1995. On Bias, Inconsistency, and Efficiency of Various Estimators in Dynamic Panel Data Models. *Journal of Econometrics* 68:53–78.
Klingemann, Hans-Dieter, Andrea Volkens, Judith L. Bara, Ian Budge, and Michael D. McDonald. 2006. *Mapping Policy Preferences II: Estimates for Parties, Electors and Governments in Central and Eastern Europe, European Union and OECD 1990–2003.* Oxford: Oxford University Press.
Kotakorpi, Kaisa. 2006. Access Price Regulation, Investment and Entry in Telecommunications. *International Journal of Industrial Organization* 24:1013–20.
Laffont, Jean-Jacques, and Jean Tirole. 2000. *Competition in Telecommunications.* Cambridge, Mass.: MIT Press.
Li, Wei, and Lixin C. Xu. 2004. The Impact of Privatization and Competition in the Telecommunications Sector around the World. *Journal of Law and Economics* 47:395–430.
Newbery, David M. 2002. *Privatization, Restructuring, and Regulation of Network Utilities.* Cambridge, Mass.: MIT Press.
Nuechterlein, Jonathan E., and Philip J. Weiser. 2005. *Digital Crossroads: American Telecommunications Policy in the Internet Age.* Cambridge, Mass.: MIT Press.
OECD (Organisation for Economic Co-operation and Development). 2007. *Information and Communications Technologies: OECD Communications Outlook 2007.* Paris: OECD Publishing.

———. 2009. *Information and Communications Technologies: OECD Communications Outlook 2009.* Paris: OECD Publishing.

Pindyck, Robert S. 2007. Mandatory Unbundling and Irreversible Investment in Telecom Networks. *Review of Network Economics* 6:274–98.

Rey, Patrick, and Jean Tirole. 2007. A Primer on Foreclosure. Pp. 2145–2220 in vol. 3 of *Handbook of Industrial Organization,* edited by Mark Armstrong and Robert H. Porter. Amsterdam: North-Holland.

Rosston, Gregory L., and Roger G. Noll. 2002. The Economics of the Supreme Court's Decision on Forward Looking Costs. *Review of Network Economics* 1:81–89.

Sappington, David E. 2005. On the Irrelevance of Input Prices for Make-or-Buy Decisions. *American Economic Review* 95:1631–38.

Sibley, David S., and Dennis L. Weismann. 1998. Raising Rivals' Costs: The Entry of an Upstream Monopolist into Downstream Markets. *Information Economics and Policy* 10: 451–70.

Sidak, J. Gregory, and Daniel F. Spulber. 1996. Deregulatory Takings and Breach of the Regulatory Contract. *New York University Law Review* 71:851–923.

Valletti, Tommaso. 2003. The Theory of Access Pricing and Its Linkage with Investment Incentives. *Telecommunications Policy* 27:659–75.

Vogelsang, Ingo. 2003. Price Regulation of Access to Telecommunications Networks. *Journal of Economic Literature* 41:830–62.

Wallsten, Scott. 2005. Broadband Penetration: An Empirical Analysis of State and Federal Policies. Working Paper No. 05–12. American Enterprise Institute–Brookings Joint Center for Regulatory Studies, Washington, D.C.

———. 2006. Broadband and Unbundling Regulations in OECD Countries. Working Paper No. 06–16. American Enterprise Institute–Brookings Joint Center for Regulatory Studies, Washington, D.C.

Wooldridge, Jeffrey M. 2002. *Econometric Analysis of Cross Section and Panel Data.* Cambridge, Mass.: MIT Press.

Woroch, Glenn A. 1998. Facilities Competition and Local Network Investment: Theory, Evidence and Policy Implications. *Industrial and Corporate Change* 7:601–14.

Zenhäusern, Patrick, Harry Telser, Stephan Vaterlaus, and Philippe Mahler. 2007. Plaut Economics Regulierungsindex: Regulierungsindex in der Telekommunikation unter besonderer Berücksichtigung der Investitionsanreize. Unpublished manuscript. Plaut Economics, Olten.