

***When is Competition Not Good? The Case of Compelled Access and  
Maximum Rate Regulation for Railroad “Captive Shippers”***

by

Robert E. Gallamore  
Director, the Transportation Center and  
Professor of Managerial Economics and Decision Strategies, Kellogg School of Management  
***Northwestern University***

and

John C. Panzar  
Louis W. Menk Professor of Economics  
***Northwestern University***

***ABSTRACT***

As partially regulated natural monopolies, American railroads face the characteristic difficulty of earning sufficient yields on traffic moving at rates above marginal and average costs to warrant reinvestment and capacity expansion – without enflaming infra-marginal customers and running afoul of regulatory rules based on “reasonableness” of rates. While the Staggers Rail Act lessened regulation and has fostered substantial cost savings, dramatic productivity improvements, sharply lower average rates, and improved industry profitability – this has occurred at the expense of industry employment levels, major carrier service to thin markets, and, in a few cases, possibly higher rates to so-called “captive shippers.” American shippers are benefitting from unambiguously lower average real rates since passage of the Staggers Act, and, importantly, the governing regulatory authority finds no firm evidence of a widening gap between exclusively-served and other rail shippers since 1984.

Rate trends notwithstanding, a frequently-advocated policy change is “Open Access,” which would require carriers with established market power over relevant shippers to make their track infrastructure available to competitors. Railroads charge this “re-regulation” runs counter to Staggers Act principles (including implicit acceptance of Ramsey inverse elasticity pricing) and, by reducing enterprise profitability and ability to invest, would leave nearly all shippers and the national economy worse off. Our paper explores the theoretical issues and several practical problems arising in “Open Access”

proposals. We conclude that constrained market pricing under ICC and STB supervision has been the correct policy, and more radical measures such as “Open Access” are not warranted.

## ***I. Historical Background and Statement of the Issues***

The history of American railroad economic performance in the Twentieth Century is four-fifths the story of slow relative decline under increasingly stringent and misguided regulation, and one-fifth the story of the industry’s recovery under a liberalized regulatory regime mandated by the Staggers Rail Act of 1980. The purpose of the Staggers Act was to allow railroads to operate as almost all other American companies did, under the discipline of market forces rather than man-made regulation. Bureaucratic staff studies, extensive *ex parte* investigations, and court-like adversarial rate-making processes were to be replaced by the fair and automatic decisions of the marketplace.<sup>1</sup> Industry economic performance improvements in the post-Staggers Act period have been achieved to a degree far exceeding most observers’ expectations, as shown in Figure 1. Since 1980, American railroads have become far more productive users of resources, have significantly increased the volume of freight service provided, and have substantially lowered average charges to customers in real dollars.

Experience under the Staggers Rail Act, particularly the level and incidence of actual railroad rates, is essential context for our study of widely discussed “Open Access” proposals in this paper. Given the stakes for both railroads and shippers, it is not surprising that analysis of the trend in railroad rates since passage of the Staggers Act has been a consuming activity. The Surface Transportation Board (successor to the Interstate Commerce Commission since 1995) concluded in a report published in 2000 that

the average, inflation-adjusted rail rate had continued a multi-year decline in 1999 and that, since 1984, real rail rates had fallen 45 percent. . . According to the board, the results of its study implied that,

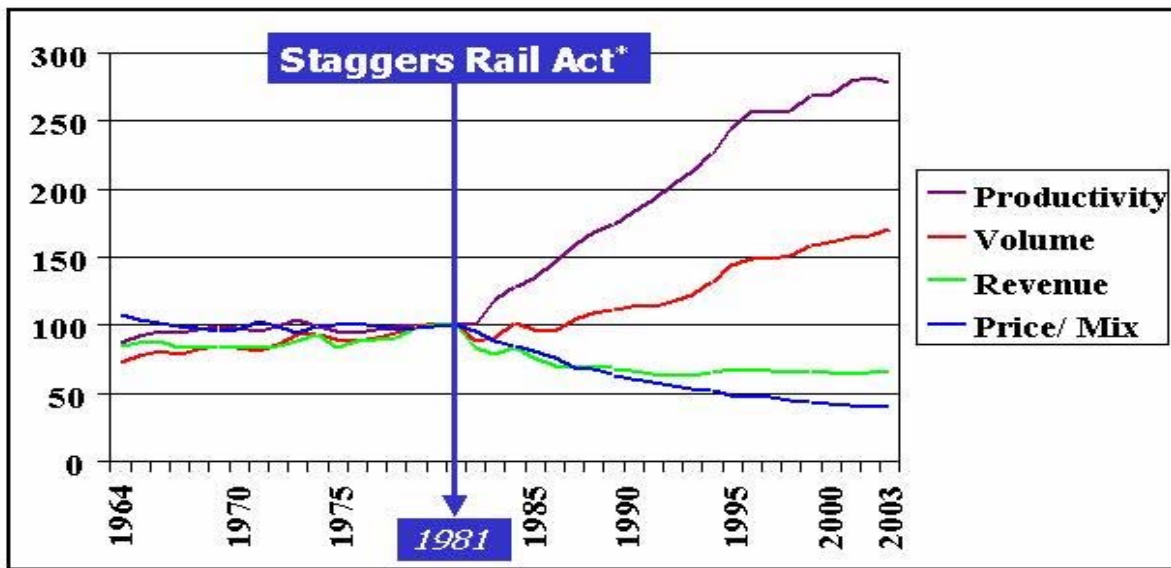
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<sup>1</sup> For detailed summaries of the Staggers Act impact on American railroads, see Robert Gallamore, “Regulation and Innovation: Lessons from the American Railroad Industry,” in José Gómez-Ibáñez, William Tye, and Clifford Winston, eds., *Essays in Transportation Economics and Policy: A Handbook in Honor of John R. Meyer*, (Washington, DC: Brookings Institution, 1999) pp. 493-529, and Curtis Grimm and Clifford Winston, “Competition in the Deregulated Railroad Industry: Sources, Effects, and Policy Issues,” in Sam Peltzman and Clifford Winston, eds., *Deregulation of Network Industries: What’s Next?* (Washington, DC, AEI-Brookings Joint Center for Regulatory Studies, 2000).

although railroads retain a degree of pricing power in some instances, nearly all productivity gains achieved by railroads since the 1980s (when railroad economic regulation was reduced) have been passed on to rail customers in the form of lower rates. The board estimated that rail shippers would have paid an additional \$31.7 billion for rail service in 1999 if revenue per ton-mile had remained equal to its 1984 inflation-adjusted level.<sup>2</sup>

## *Performance of the American Railroad Industry 1964 – 2003*

Constant Dollars Where Appropriate, Indexed to 1981 = 100



\* The Staggers Rail Act was passed in 1980, but implementation did not begin until 1981.

*Figure 1: Source: Chart Concept in Gallamore (Brookings, 1999), p. 496.  
Data: Courtesy Association of American Railroads.*

More recently, the General Accounting Office (GAO) has produced two reports that are models of understated objectivity on the issue:

Rates for coal, grain (wheat and corn), chemicals . . . and transportation equipment . . . generally fell from 1997 through 2000. . . These decreases followed the general trend we previously reported on for the 1990-1996 period, and, as before, tended to reflect railroad cost reductions brought about by

<sup>2</sup> Surface Transportation Board, *Rail Rates Continue Multi-Year Decline*, Office of Economics, Environmental Analysis, and Administration (Dec. 2000) quoted in U.S. General Accounting Office, *Railroad Regulation: Changes in Railroad Rates from 1997 through 2000*, GAO-02-524 (June 2002), p. 11.

continuing productivity gains in the railroad industry that have allowed railroads to reduce rates in order to be competitive.<sup>3</sup>

In this paper, we endeavor to show what is at stake in the way of railroads' needs for capital investment funds and the transaction costs inherent in managing "artificial competition." In the end, political resolution of the issues raised by the "Open Access" controversy may come to whether a reasonable balance has been struck between the iron laws of economics driving natural monopoly railroads to depend on price differentiation, and the howls of shippers who do not like paying higher than average rates just because their demand is inelastic.

The Staggers Rail Act was passed in 1980, and as shown above, it has been not only the salvation of the railroads but an enormous benefit to shippers in the form of unambiguously lower average rate levels. Only a few visionaries foresaw the impact of legalizing carrier-shipper contracts and how that and other reforms could take deadweight regulatory losses out of the system for the win-win benefit of both railroads and their customers.

Most of them, that is. Railroads are, in the main, natural monopolies. There are not many carriers between any two points on the map; except for intermodal (trailer or container) freight and transloading – often done for commodities as diverse as coal, grain, cement, fertilizer and even auto parts – frequently only one railroad will directly serve both the origin and destination of a given shipment. Some customers finding themselves in this position claim they are "captive" to the single serving railroad, and believe government intervention is necessary to protect them from rate gouging. Typically they have not argued for reinstatement of the entire formerly existing rate regulatory regime, but they do urge "Open Access." This can be defined as the insertion of new competition in the form of service by another railroad operator (or the shipper itself) over the rails of the existing carrier to the nearest feasible connection with a second railroad. Since presumably the new operator would have to be credentialed in some way, the strategy ought to be called

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<sup>3</sup> U.S. General Accounting Office, *Railroad Regulation: Changes in Railroad Rates and Service Quality Since 1990*, GAO/RCED-99-93 (Washington, D.C., April 16, 1999) and *Railroad Regulation: Changes in Railroad Rates from 1997 through 2000*, *loc. cit.*, p. 7.

“competitive access” rather than “open” access, which would seem to allow *any* operator, and any *number* of them, to participate. Railroads latch on to the term “forced” or “compelled” access – we say “artificial competition” – since it is impossible to imagine railroads voluntarily ceding exclusivity without a regulatory requirement to do so.

### ***The Theory of the Firm***

When we accept that a free market fails (producing too little of what society wants or too much of what it does not want), we might look to alternative ways of organizing the production of goods – through a government agency, a chartered association, *or a private firm*. Where the *market* was an abstraction (both its definitional limits and its exact competitive composition), the *firm* has a real cost structure. In this world, society relies on firms to organize economic activity efficiently, produce satisfactory products for customers, and meet accepted standards of behavior.<sup>4</sup> “From the perspective of the public’s interest in an efficient allocation of resources, the question of mandatory access to rail facilities turns critically on the relative efficiency of the firm versus the market.”<sup>5</sup>

Substituting a firm for the market means that economic efficiency depends entirely on the incumbent firm’s production costs and pricing behavior. The firm’s performance must be characterized in terms of how the enterprise is organized, how it will be managed, how it relates to buyers and sellers in its downstream markets and upstream supply chains, and how it will be regulated. As firms assemble capital to create factories and facilities of production, they create fixed costs. As they expand capacity to produce more volume or serve more widespread customers, they create more common costs (overhead, maintenance, renewal) that will be spread over total sales volumes – the more the better – until marginal costs exceed marginal sales revenue. The point is that what the firm decides

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<sup>4</sup> We are indebted to Amy Candell and Joseph Kalt for these observations, traceable to Ronald Coase. Candell and Kalt’s excellent unpublished paper is discussed in more detail below. Amy B. Candell and Joseph P. Kalt, *Open Access for Railroads? Implications for a Non-Hub, Congestible Network Industry*, May 2000, 33 pages.

<sup>5</sup> *Ibid.*, p.2.

to produce, what means of production it employs, how much it produces, and how widely it can sell the product all affect its cost performance and capacity utilization.

### ***Maximum Rate Regulation***

The distinction between rail shippers as a group and individual customers who feel they are “captive” is at the heart of “Open Access” proposals, and must be addressed as part of the century-long struggle to find a workable policy for regulating maximum railroad rates. The issue of regulating natural monopolies always comes down to the rules for rate reasonableness, maximum rate caps, and determination of the relevant market. Several maximum rate regulatory schemes have been devised over the years; these include:

- Valuation-based maximum rate of return ceilings on a relevant investment base.
- Inverse elasticity of demand, or Ramsey pricing, guidelines for rate reasonableness.
- Average cost mark-up rules, which in the case of the Staggers Act set a threshold above which additional rate and competitive tests may come into play. (See next bullet and footnote.)
- Detailed, site-specific cost investigation schemes such as the stand-alone costing used by the ICC in “captive shipper” and “bottleneck” rate cases over the last two decades.<sup>6</sup>

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<sup>6</sup> As explained admirably by Grimm and Winston, *ibid.*, p. 46, note 12: “The Surface Transportation Board is the successor to the Interstate Commerce Commission and has the authority to determine the reasonableness of challenged rates in the absence of competition. After a shipper files a complaint, the board assesses whether the railroad has ‘market dominance.’ By statute, a railroad does not have market dominance if its revenue is no greater than 180 percent of its variable costs for transporting a shipper’s commodities. If the railroad’s percentage exceeds the statutory level, the board next determines whether the shipper has a competitive alternative in the form of access to other railroads or other forms of transportation, such as trucks or barges. Until January 1999 the board also considered two other forms of competition: the ability to ship from and to alternatives (geographic competition) and the ability to substitute other products effectively for the one the railroad ships (product competition). If the board finds that a railroad dominates the shipper’s market, then it proceeds with further assessments to determine whether the actual rate the railroad charges is reasonable. Under its standard guidelines, shippers are required to demonstrate how much an optimally efficient railroad would need to charge [the stand-alone test].” Grimm and Winston estimate (based on shipper surveys) that a credible challenge to a “captive” rate under these guidelines costs between \$500,000 and \$3 million. *Ibid.*, p. 46.

Not only has the market performance of the railroads in the post-Staggers period been outstanding in terms of actual rate-levels, the existing regulatory regime offers explicit protections to shippers able to establish that they have inadequate competitive options and therefore are victimized by unreasonably high railroad rates. Under the Act, shippers able to prove such circumstances to the Surface Transportation Board (STB)<sup>7</sup> are entitled to rate relief. For example, a recent STB decision involving BNSF Powder River Basin coal deliveries to a Brush, Colorado power generation plant found BNSF had “market dominance” for the transportation and that the utility has shown the rail rates to be unreasonably high compared with those that would have provided a fair return on investment to a hypothetical stand-alone railroad competing in the market.<sup>8</sup> By one informed count, since the rules for formulating “stand-alone railroad” (SARR) cases with multi-year discounted cash flow elements were revised in 1994, railroads have prevailed in five of the “captive shipper” cases and lost seven.<sup>9</sup>

In addition to rulings in rate cases, the STB provides general oversight of the railroad industry and rules on applications for mergers. The regulatory authority can and does condition mergers on retention of existing levels of competition in key market segments. The Union Pacific – Southern Pacific combination in the mid 1990s incorporated thousands of miles of new trackage rights in this quest; most of the proceedings in the UP-SP case dealt with the question of competitive remedies in

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<sup>7</sup> Prior to 1996, the Interstate Commerce Commission.

<sup>8</sup> Surface Transportation Board, STB Docket No. 42057. *PUBLIC SERVICE COMPANY OF COLORADO D/B/A XCEL ENERGY V. THE BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY*, Decided June 7, 2004. Referenced in *Traffic World*, June 21, 2004. As described in the STB decision, Xcel designed a hypothetical stand-alone railroad called the Wyoming Colorado Coal Railroad to serve the Pawnee power plant near Brush, CO, and other traffic. Xcel’s analysis relied extensively on so-called “cross-over” traffic – movements for which WCC would not replicate BNSF’s other service, but rely on interchange to the residual BNSF (and UP) to complete deliveries to 35 of 37 shippers in the study group (over 90 percent of the total). Xcel’s own traffic would be local to the WCC stand-alone railroad. BNSF challenged the substantial use of cross-over traffic in the stand-alone case, arguing that unless revenue allocations are accurate, the logical connection between costs and revenues in the stand-alone case is defeated. Importantly, the STB recognized that cross-over traffic might have ramifications beyond the stand-alone railroad, possibly requiring changes in operations. Therefore the Board cautioned proponents of re-routings that the stand-alone analysis “must either take responsibility for the entire movement from origin to destination or fully account for the ramifications of requiring the residual carrier to alter its handling of the traffic.” STB Docket 42057 at p. 20.

<sup>9</sup> Information courtesy of Union Pacific Railroad, Oct. 2004. In two of the seven cases where rates were found unreasonably high, they were capped at the lowest rate the STB can prescribe under the law, 180 percent of variable costs.

cases where competition otherwise would be reduced from three to two or two to one carriers in the relevant market segment.<sup>10</sup> Another post-Staggers competitive initiative has liberalized the ability of second carriers to construct access lines into single-served shipper facilities without hindrance by the existing carrier. Finally, in a little-known provision of the law, the STB can order a railroad having exclusive access to an important facility to grant another carrier “reciprocal switching” rights to the nearest competitive junction if this is deemed to be “in the public interest.” The STB’s standard for such applications requires a finding of anticompetitive action or inadequate service, and, to our knowledge, no shipper has yet mounted such a case. All of the Staggers Act protections cited here play a role in enabling the STB to find a proper public interest balance under conditions of natural monopoly.

### ***The “Railroad Problem” Today – Insufficient Earnings to Sustain Reinvestment***

The persistent railroad problem, never fully resolved in over a hundred years of regulatory history, is that as a declining cost industry, socially optimal levels of railroad production (volume) occur at marginal costs levels lower than average unit costs – meaning that the railroad firm cannot be profitable without charging differential prices to infra-marginal customers. The railroad cannot both price at marginal incremental costs (the socially optimal level) and recover fixed costs necessarily incurred in providing the service.<sup>11</sup> The corollary is equally important for both economic theory and policy conclusions: if a railroad cannot cover average fixed and variable costs with average unit prices it runs a deficit and cannot adequately reinvest. It consumes capital to cover the deficiency in its rates. It subsidizes current customers with the dwindling capital reserves of current shareholders and takes from

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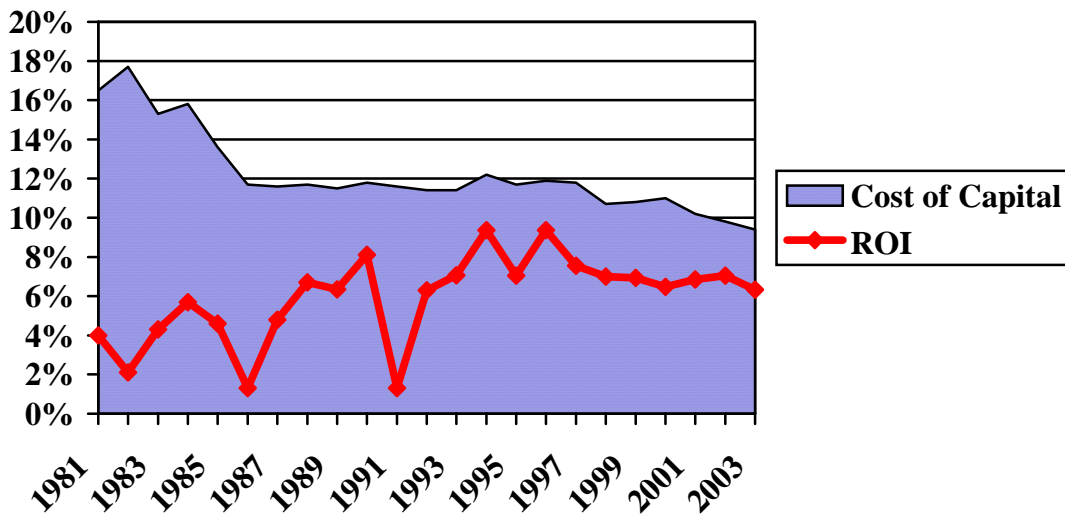
<sup>10</sup> The case even produced at least one instance in which the ICC required trackage rights to add a third option in a market previously served by only two carriers. The UP/SP merger conditions also resulted in significantly lower reciprocal switching charges for the traffic of other railroads to certain SP points.

<sup>11</sup> Theodore Keeler, *Railroads, Freight, and Public Policy*, Washington, DC: The Brookings Institution, 1983, Chapter Three, pp. 43-61, and citations therein. If the firm has constant returns to scale and no unique product, substitute capacity will be formed. If it has rising marginal costs due to scarcity of inputs or production gridlock, we know other suppliers are likely to have the same problem and we will do without.



future owners and customers the realization of future economic benefits. The way the reinvestment dilemma facing railroads is most often expressed in North America is that the industry is not “earning its cost of capital.” Figure 2 charts these relationships over recent history.

***Class I Railroads: Cost of Capital Exceeds  
Return on Investment***

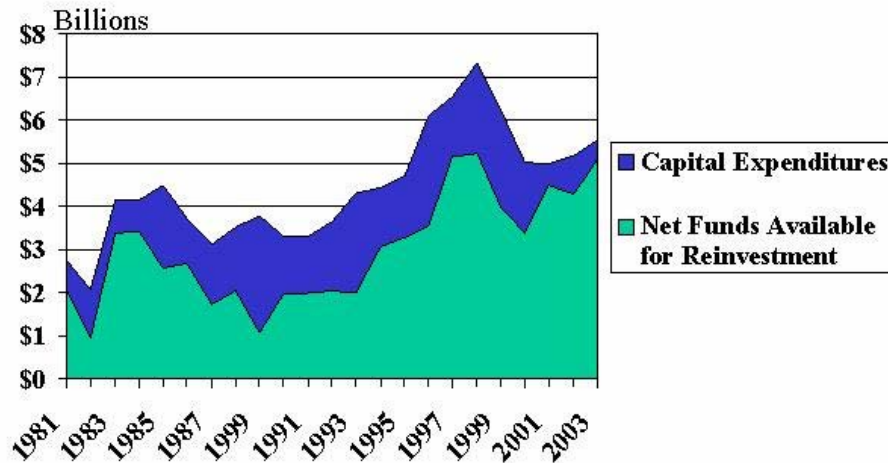


*Figure 2. Source: Data Courtesy of the Association of American Railroads*

Some observers frame the reinvestment problem slightly differently, as the current and future prospect of insufficient industry capacity, with attending problems of service reliability. In truth, these are only manifestations of the natural monopoly declining cost and marginal pricing problems come home to roost in a different part of its life cycle. Capacity shortages are the direct descendent of insufficient investment, traceable entirely to inadequate earnings (and inadequate public investment, if that is your orientation). Figure 3 demonstrates that the fault is not unwillingness of railroad

managements to make capital investments in their firms, but the insufficiency of available funds – due in turn to inadequate total revenues at current output and price levels.

## Class I Railroads: Capital Expenditures Exceed Net Annual Funds Available



*Figure 3. Source: Data Courtesy of the Association of American Railroads*

The railroad problem in America today is that there will not be private sector railroads into the future without permitting price differentiation according to customer's willingness to pay. Any regulatory system that does not permit railroads to use some kind of "mark-up" strategy for customers able and willing to pay more than the marginal cost of their services will end private sector railroading, as we know it in America. Any plan to compel new market entry ("competitive access") as a policy alternative to legal and laudable price differentiation will have the same result – railroads will not be able

to be profitable and reinvest for future business; they will exist only with large government subsidies.<sup>12</sup> This is why it is so self-defeating for rail customers, *as a group*, to urge “Open Access” and to rail against price differentiation. Indeed, average prices tending to low marginal cost levels exacerbates any existing supply shortages. Better for all but the very marginal (and perhaps the “most captive”) customers to allow average (differentiated) prices to rise to a level that discourages low-value demand in peak periods.<sup>13</sup>

## **II. A Review of Current Literature on “Open Access” and Related Issues**

Lack of a natural experiment in the data has hampered empirical investigations, but economic studies of the effect of Surface Transportation Board (STB) regulatory actions have been made, and research concerning the strategy of “inserting competition” via “Open Access” as a maximum rate regulatory mechanism is developing swiftly. Four investigations stand out, and these are summarized next.

Brookings Institution fellow Cliff Winston and his collaborator Curtis Grimm place the “Open Access” debate in the context of post-Staggers Act regulatory practice and railroad economic performance overall. They describe a “rare ‘win-win’ outcome for consumers and industry,” but note the persistence of complaints about railroad service quality and dissatisfaction of some shippers with STB handling of maximum rate cases. Grimm and Winston developed a competition model<sup>14</sup> and survey method to analyze specific shipping corridors in 1998. Their estimates

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<sup>12</sup>One needs look no further than rail public transit to see the prototype for this outcome. Private capital went into transit systems in their early days. But the economic laws of natural monopoly drove rates to extremely low and undifferentiated levels, and all profitability evaporated ages ago. Low transit fares may yield the socially optimum level of output (some economist even recommend “free transit” to maximize public benefits), but transit system deficits are endemic and virtually all capital improvements are publicly financed.

<sup>13</sup> By this same logic, most highway users would be better off if congestion tolls were to break up congestion and provide a source of funding for de-bottlenecking the highway segments of interest, but doing so is politically difficult.

<sup>14</sup> The article describes rail-rail competition diagrammatically for the cases of direct rail service, reciprocal switching, terminal switching, proximity of railroads (latent access by new construction), and geographic source competition. For a foundational discussion of the characteristics of railroad competition, see the work of the U.S. Railway Association prepared for

substantiate the theoretical arguments that several forms of railroad and intermodal competition affect rail charges. An additional carrier that serves the origin either directly or by reciprocal switching lowers annual freight charges nearly \$200,000, or 8 percent of average charges. As suggested previously, terminal carriers are a strong source of competition because they facilitate competition among Class I carriers while maintaining independent operations.<sup>15</sup>

Sam Peltzman and Clifford Winston conclude their volume saying that, given the purposes of the Staggers Act to improve railroad financial performance (and notwithstanding its overall win-win result), it should not be surprising that the regulatory authorities have decided cases in a way that tends to favor railroads over captive shippers. “Even if this is true, Grimm and Winston find this protection has not led to appreciable efficiency losses.”<sup>16</sup>

Moving to the second important title in this review, economists Marc Ivaldi and Gerard McCullough have made innovative econometric studies of American railroad cost data for the period 1978-1997.<sup>17</sup> The authors summarize their three principal empirical findings as being:

- (1) *Freight Railroads Still Exhibit Significant Returns to Density Despite the Merger Activity of the Past Decades.* Increases in traffic density reduce unit costs, suggesting network operators should have some autonomy to control routings and thus build densities. Access proponents might argue, however, that the newcomer’s aggressive marketing would result in more economies of density.<sup>18</sup>
- (2) *There are Significant Second-order Cost Relationships Among Railroad Operational Outputs.* “[E]ven if railroads were separated into operational and infrastructure entities, the firms would still

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consideration of options for restructuring the bankrupt Northeast railroads in the *Preliminary System Plan* (1975), specifically Chapter 8. This material was also published in an edited form as Chapter 3 “Intermodal and Intramodal Competition,” in Paul W. MacAvoy and John W. Snow, eds., *Railroad Revitalization and Regulatory Reform: Ford Administration Papers on Regulatory Reform* (Washington, DC, American Enterprise Institute, 1977).

<sup>15</sup> Grimm and Winston, *op. cit.*, p. 57. Grimm and Winston remind us that, not only did the split sale of Conrail to Norfolk Southern and CSX in the late 1990s reestablish two-carrier competition lost across much of the Northeast in the Penn Central merger and subsequent 4R Act approval of the USRA Final System Plan, it established a “Conrail Shared Assets” terminal company in Northern New Jersey that improved competitive options for many chemical and intermodal shippers. *Ibid.*, p. 68.

<sup>16</sup> Peltzman and Winston, *op. cit.*, p. 190.

<sup>17</sup> Marc Ivaldi and Gerard J. McCullough, “Density and Integration Effects on Class I U.S. Freight Railroads,” *Journal of Regulatory Economics*, 19:2 (2001), pp. 161-182

<sup>18</sup> *Ibid.*, p. 178. One could easily argue, however, that on today’s capacity-constrained railroads, an aggressive new entrant might simply bring about traffic congestion and thus higher marginal costs. This would be particularly true if the incumbent railroad were forced to provide power and crews for the new traffic and if the forced-in entrant were not required to pay true costs. See more below in the discussion of future capacity constraints.

experience operational returns to density and (like airlines) would enjoy large market shares.” Contestability might limit market abuses, but “Open Access” “would not necessarily lead to competitive outcomes either.”<sup>19</sup> These results seem to track the European experience since adoption of EU rules favoring vertical unbundling.

- (3) *There are Significant Vertical Cost Relationships Between Freight Operations and Infrastructure Operations.* The Ivaldi and McCullough paper finds modest cost complementarities between railroad general carload freight operations and infrastructure maintenance, but both in the case of heavy bulk commodities and higher speed intermodal trains, they find anticomplementarities between train operations and maintenance costs. It is not clear whether the result is due to the nature of the traffic – heavy trains wear out rail and fast trains require frequent track maintenance – or interference between operations and maintenance, or both.<sup>20</sup> At least there is a suggestion that there could be coordination issues – currently resolved within the firm – yet giving rise to transaction costs (of which more later). Ivaldi and McCullough note that their result supports the finding of D. J. Teece in a 1980 paper that “it is transaction costs rather than economies of scope or scale which will be the critical factors in determining whether vertical integration is more efficient.”<sup>21</sup>

Ivaldi and McCullough conclude with the note that their findings reinforce the understanding that railroads are indeed natural monopolies which may need some form of regulation, while questioning whether a broad access regime would be an effective substitute. They note, for example, that it is dangerously misleading to argue for open rail access by analogy to telecommunications and electric power utilities; locomotives are larger than electrons and trains are harder to switch than electricity. If anything, competitive access would *require* administrative regulation, because in the U.S. context, the owning railroad could exclude competitors by simply charging high prices for access.

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<sup>19</sup> *Ibid.*, p. 179.

<sup>20</sup> Interestingly, there is possibly a further explanation in the distinction between operating costs for unit trains (coal, grain, intermodal) and mixed manifest (general carload) trains that require classification and more industrial switching than bulk or intermodal unit trains. Classification yard costs are different in kind than line of road maintenance costs. How yard operations would be handled in an open access regime is a very good question. It is entirely possible that shippers or receivers of unit trains might want to enter the trainload operations business, but absolutely not want to get into the mixed manifest train business. If a regulatory authority were to permit this kind of “cherry picking” under open access legislation, it could accelerate the demise of “loose car” railroading.

<sup>21</sup> *Ibid.*, p. 179.

A third example of recent economic analysis of the issues raised by competitive access proposals is a report for the Federal Railroad Administration, *Railroad Cost Conditions – Implications for Policy*, prepared by John Bitzan of North Dakota State University.<sup>22</sup> In studying cost relationships exhibited by two different kinds of railroad mergers, parallel and end-to-end, Bitzan concludes:

In considering the issue of parallel mergers, the study finds evidence that suggests that railroads are natural monopolies over a fixed network size. This suggests that maintaining competition in markets impacted by parallel mergers is not justified by railroad cost considerations. Further, it is shown that the price increases resulting from the parallel merger would have to be large before the prevention of such mergers would be beneficial from the viewpoint of society. In examining the issue of end-to-end mergers, the study finds evidence to suggest that railroads are not natural monopolies as network size is expanded. This suggests that further end-to-end mergers are not justified by railroad cost considerations.<sup>23</sup>

Continuing his study summary with respect to the cost implications of railroads competing over one rail network, Professor Bitzan addresses the issue of unbundling track ownership and railroad service operation by a vertical segregation of roles:

[T]he study finds: (1) that there are economies associated with vertically integrated roadway maintenance and transportation, suggesting that separating the two would result in increased resource costs, and (2) railroads are natural monopolies in producing services over their own network, suggesting that multiple-firm competition over such a network would result in increased resource costs. These findings suggest that policies introducing railroad competition through ““Open Access”” or on bottleneck segments would not be beneficial from a cost perspective. Moreover, the price decrease that would be necessary for the introduction of such competition to be beneficial would be large. Thus, to the extent that rate and service problems exist in the railroad industry, policies aimed at strengthening rate reasonableness guidelines and service guidelines would be preferred to policies aimed at introducing or preserving competition.<sup>24</sup>

A fourth excellent contribution to economic understanding of the issues raised by proposals for unbundling railroad operations from infrastructure ownership and mandating competitive access is a May, 2000 paper for the Advanced Workshop in Regulation and Competition at Lake George, NY, by

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<sup>22</sup> John Bitzan, *Railroad Cost Conditions – Implications for Policy*, Upper Great Plains Transportation Institute, May 10, 2000.

<sup>23</sup> *Ibid.*, p. 115.

<sup>24</sup> *Ibid.*

Amy Candell of Lexicon, Inc. and her mentor, Joseph Kalt of Harvard University.<sup>25</sup> After noting Staggers Act reforms have been at the heart of rail industry revitalization, Candell and Kalt observe that controversy continues, because inframarginal prices can yield rents, depending on case-specific competitive pressures. The law might yield overall economic efficiency, but sole-served shippers do always not like the result.<sup>26</sup>

Candell and Kalt say periodic proposals that would require track owners to open their facilities to multiple train service operators challenge the economic theory of the firm to its core, and they cite two “powerful and insightful tautologies” of Ronald Coase. The first is that a firm may substitute for a market in organizing complex production activities, and the second is that the relative efficiency of the firm over markets in this role rises as transaction costs (the difficulty the market finds in orchestrating complex interactions) increase.<sup>27</sup> As a key illustration of transaction costs, Candell and Kalt point out “the value of getting cars through a particular yard at a particular time is dependent upon a myriad of logistical coordination steps that put locomotives and crews and cars in compatible places and compatible times.”<sup>28</sup>

Candell and Kalt argue that railroad networks are grids more than hub-and-spoke configurations, and are highly subject to congestion. Individual, “addressable” lane loadings of the network, representing connections between a very large number of points that must be coordinated, mean that there are strong complementarities among the various operations within the network – whether these are managed by a single firm or multiple rolling stock service providers.<sup>29</sup> In contrast to natural gas or electricity, which are fungible and which follow the path of least resistance to consumption, railroad shipments typically match specific origins and destinations. Thus, the rail system

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<sup>25</sup> Candell and Kalt, *op. cit.*

<sup>26</sup> *Ibid.* p. 10.

<sup>27</sup> Ronald Coase, “The Nature of the Firm,” *Journal of Political Economy*, 1937, cited in Candell and Kalt, *op. cit.*, p. 2.

<sup>28</sup> *Ibid.*, p. 22

<sup>29</sup> *Ibid.*, p.20.

is “notably congestible, with capacity constraints and stochastic disruptions that create intra and inter carrier externalities in the form of incompatible scheduling demands and constraints.”<sup>30</sup> The Coase theorem says that market could handle the externalities if there were no transaction costs<sup>31</sup> – but that clearly is not the case. Coordination *inside the firm* looks more promising, especially since unbundling and “Open Access” “do not remove the problems of allocating scarce rail capacity and ensuring sustainability of infrastructure facilities and investment.”<sup>32</sup>

Candell and Kalt also usefully point out the value of contract authority for facilitating economically efficient arrangements in markets characterized by countervailing power. The Staggers Act allowed “contractual flexibility and market responsive pricing,” while monitoring overall company revenues for adequacy – a part of the Act’s careful balance between rate reasonableness for individual shippers and carrier earnings sufficient to sustain capacity for the future. “[T]he widespread use of negotiated contracts [counteracts] tendencies for inefficiency that might otherwise arise from discrepancies between prices and marginal costs of service.”<sup>33</sup>

### ***III. The Economics of Competitive Access***

#### ***Competitive Access Proposals***

Access issues are currently at the center of the public policy debate in most network infrastructure industries. The details of the policy issues vary from industry to industry and from country to country. The complexity and controversy arises because, by its very nature, access policy

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<sup>30</sup> Candell and Kalt, *op. cit.*, p. 4.

<sup>31</sup> The Coase Theorem states that, “[r]egardless of how property rights are assigned with an externality, the allocation of resources will be efficient when the parties can costlessly bargain with each other.” David Besanko and Ronald Braeutigam, *Microeconomics: An Applied Approach*, New York: John Wiley & Sons, 2002, p. G-1.

<sup>32</sup> *Ibid.*, p. 4.

<sup>33</sup> *Ibid.* p. 9.



involves regulatory intervention in the internal organization of the firm. In order to focus on the economic issues, let us briefly discuss the types of railroad access policies currently under discussion.

**Vertical separation and competitive access.** This approach to competitive access, in place in the United Kingdom and under serious consideration elsewhere in the European Union, requires that the owner and operator of the infrastructure be a separate entity from the firms that operate trains. The infrastructure owner is required to grant access to various train operators on non discriminatory terms.

**Operating access.** Railroads remain vertically integrated, but competitors must be granted access to operate trains over portions of a railroad's infrastructure.

**Shipment access.** Shippers and/or competitive railroads can contract with a railroad for shipments over a portion of the railroad network at regulated rates. In some versions of shipment access proposals, shippers could choose the interchange point they want to use.<sup>34</sup>

**Mandated reciprocal switching.** Regulatory authorities may order vertically integrated railroads to switch (set out and pick up) to on-line industries freight cars for the account of another railroad. These cars would then be delivered or returned to the competitor railroad at a near-by junction. In the USA, mandatory reciprocal switching may be ordered by the STB if it is in "the public interest," as described earlier. In Canada, "interswitching" access is available to single-served shippers at origins or destinations and at prescribed rates to junctions as far away as 30 kilometers.<sup>35</sup>

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<sup>34</sup> Railroads point out that this kind of intervention in their operations would hinder their efforts under the Staggers Act to reduce inefficient or unprofitable interchange points. Mutual actions to concentrate interchange traffic has reduced costs and improved service, especially by reducing the number of separate interchange blocks that must be made in switching yards and transfer movements that must be conducted between railroads at interchange points. If shippers were able to dictate interchange points from their own parochial point of view, system-wide (or network) efficiencies may be lost.

<sup>35</sup> The Canadian Pacific Railway courteously provides this information on interswitching in Canada:

A shipper with access to only one federal railway at the origin or destination of a haul may have its cars interswitched from one carrier to another at prescribed rates, if the shipper's siding is within a 30-kilometer radius of the interchange point. At this time, the distance establishing the outer limit of interswitching zones, measured by track miles, is 6.4km (zone 1), 10km (zone 2), and 20km (zone 3). Interswitching zone 4 is measured on a direct (crow flies) method. In order to fit within zone 4, the shipper's facility must be within 30km of the radius of an interchange. Rates are established for each zone. Under certain circumstances, the Agency can permit interswitching beyond the 30-kilometer limit.

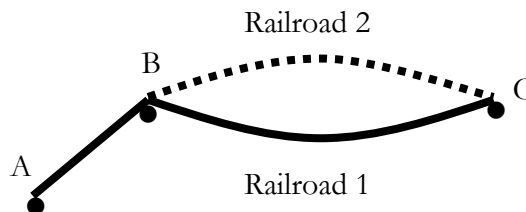
**Competitive Line rates.** A shipper located beyond the 30-kilometre interswitching limit may ask the Canadian Transportation Agency to set a competitive line rate for moving goods over the originating railway to the interchange point, for transfer to another railway. First, arrangements must be completed with the connecting carrier for the balance of the

**Construction access.** Regulators may encourage or prevent construction by a competitor railroad of new rail facilities to reach a single-served shipping or receiving point.

Obviously, the effects of any competitive access policy depends upon the details of the proposal. The third type, shipment access, would seem to give rise to fewer coordination problems than the other two, unless shippers were permitted to dictate interchange points. Yet, it is important to emphasize, *any* policy of mandated access must be carefully evaluated because it interferes with the internal organization and revenue adequacy of the incumbent firm, and may give rise to new transaction costs.

### ***A Stylized Rail Network***

At this point it is helpful to conduct the discussion in the context of a stylized rail transportation network. In Figure 4, Railroads 1 and 2 operate parallel lines between their junction at B and a port terminus at C. In addition, Railroad 1 operates a line that serves a “captive shipper” located at point A.



***Figure 4. A Stylized Rail Network***

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freight movement. The Agency would base the CLR on applicable interswitching rates and on the revenue the railway company generates by moving the same or substantially similar commodities over similar distances.

The status quo situation can be described as follows. Railroad 1 serves the movements of shipper A and at price  $p_A$  and receives revenues of  $p_A q_A$ . It also serves traffic originating *along* its BC link, at a price of  $p_1$ , receiving revenues of  $p_1 q_1$ . Presumably, this traffic would be classified as “competitive” because it could move over Railroad 2 by incurring somewhat higher road to rail transfer costs. Railroad 1 also competes for BC Origin and Destination traffic with Railroad 2. Let  $p_i$  denote the resulting equilibrium price and  $q_{1c}$  the equilibrium quantity of traffic carried by Railroad 1. With regard to costs, Railroad 1 incurs annualized fixed costs of  $F_A$  associated with the link AB and marginal and average variable costs of  $c_A$  per unit for traffic carried over that link. Railroad 1 also incurs annualized fixed costs of  $F_{1B}$  associated with its link between B and C. For BC O&D traffic, it incurs marginal (and average variable) costs of  $c_{1B}$  per unit for traffic carried over that link. For BC link traffic, it incurs marginal (and average variable) costs of  $c_l$  per unit and incremental (annualized) fixed costs of  $F_{1L}$ . In addition, Railroad 1 incurs annualized overhead fixed costs of  $F_l$  for the overall operation of the railroad. *These costs are not associated with any individual link in the network.* All of the afore mentioned overhead costs are *sunk* as well as fixed. That is, they cannot be avoided if the traffic in question disappears.

Railroad 2 serves traffic originating along its BC link, at a price of  $p_2$ , receiving revenues of  $p_2 q_2$ . Presumably, this traffic would be classified as “competitive” because it could move over Railroad 1 by incurring somewhat higher road to rail costs. Since Railroad 2 also competes for BC Origin and Destination traffic with Railroad 1, it earns revenues of  $p_2 q_{2c}$  where  $q_{2c}$  is the equilibrium quantity of traffic carried by Railroad 2. With regard to costs, Railroad 2 incurs annualized fixed costs of  $F_{2B}$  associated with the link BC and marginal (average variable) costs of  $c_{2B}$  per unit for traffic carried over that link. For BC link traffic, it incurs marginal (and average variable) costs of  $c_2$  per unit and incremental (annualized) fixed costs of  $F_{2L}$ . In addition, Railroad 2 incurs annualized overhead fixed

costs of  $F_2$  for the overall operation of the railroad. *These costs are not associated with any individual link in the network.*

The financial positions of these railroads in the status quo position are as follows. With respect to its captive shipper, Railroad 1 receives revenues of  $p_A q_A$ , incurring operating costs of  $(c_A + c_{1B})q_A$  and fixed costs of  $F_A$ . Clearly, Railroad 1 earns a contribution over operating costs on this traffic of  $G_A = (p_A - c_{1A} - c_{1B})q_A$ . Thus Railroad 1 earns a *net contribution* from providing service to its captive shipper given by  $N_{1A} = G_A - F_A$ . This is the amount by which revenues received from the captive shipper exceed the incremental costs of serving it. Note that these incremental costs include the fixed costs of link AB as well as the relevant operating costs because those fixed costs would be avoided if service to A were abandoned. Railroad 1 also receives contributions from providing service to its BC-link traffic in the amount of  $N_{1B} = (p_1 - c_1)q_1 - F_{1B}$ , and from its share of BC O&D traffic in the amount of  $G_{1c} = (p_c - c_1)q_{1c}$ . Railroad 2 receives contributions from providing service to its BC-link traffic in the amount of  $N_{2B} = (p_2 - c_2)q_2 - F_{2B}$ , and from its share of BC O&D traffic in the amount of  $G_{2c} = (p_c - c_{2B})q_{2c}$ .

Thus far we have described the financial situations of the railroads in our stylized example in rather general terms. Now we shall introduce more specific assumptions that both simplify the algebra and reflect market realities in the railroad industry. First, we shall assume, realistically, that rail-on-rail competition results in the market price being driven to the marginal and average variable cost of the high cost provider. We will also assume that the Railroad 2 is the more efficient provider of BC O&D service, so that  $p_c = c_{1B} > c_{2B}$ ,  $G_{1c} = q_{1c} = 0$ , and  $G_{2c} = (c_{1B} - c_{2B})q_{2c} > 0$ .

Next, consider the overall financial performance of Railroad 1. For it to achieve revenue adequacy, it would have to be the case that the net contribution from BC-link traffic plus the net contribution from captive shipper traffic would have to cover the fixed costs of the link BC plus railroad overhead costs. We shall assume that, in the status quo situation, Railroad 1 earns no more than what would be required to achieve revenue adequacy. Thus,  $N_{1B} + N_{1A} \leq F_{1B} + F_A$ . The overall financial

performance of Railroad 2 can be similarly characterized. For it to achieve revenue adequacy, it would have to be the case that the gross contributions from BC-link traffic and BC O&D traffic would have to cover the fixed costs of the link BC plus railroad overhead costs. We shall also assume that, in the status quo situation, Railroad 2 at most just achieves revenue adequacy. Thus,  $G_{2c} + N_{2B} \leq F_2 + F$ .

### ***The Logic of Constrained Market Pricing (CMP)***

All the traffic in our stylized rail network would be classified as competitive except that of the captive shipper at location A. This rate,  $p_A$ , would be subject to the Board's maximum rate regulation policies. The maximum rate Railroad 1 would be allowed to charge would be based upon the theoretical price ceiling defined by average stand alone costs for the AC traffic. This rate would be determined by the following thought experiment. Consider the (annualized) forward-looking costs of a newly constructed "stand-alone railroad" (SARR) designed for the purpose of carrying the captive shipper's traffic. Deduct from this figure the revenues the SARR could reasonably expect to receive from any other traffic carried.<sup>36</sup> Finally, divide by the annual volume of captive shipper traffic to obtain the regulated rate  $p_{max}$ .

The rationale behind the stand-alone cost test is to afford all of a railroad's customers the protection from high rates that would be present in a hypothetical contestable market. In a contestable market, no customer or group of customers could be charged more than the stand-alone cost of serving them alone. No customer group can be guaranteed more than this if served by a natural monopoly operating under conditions of increasing returns to scale. For in such cases marginal cost pricing will not allow the firm to break even. Thus, the prices of some or all services must be marked-up above their respective marginal costs, with the extent of the mark-ups for individual services determined by demand conditions. Only when the mark-ups for a group of services reach the point that revenues

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<sup>36</sup> Called "cross-over traffic" in the regulatory literature.

would cover the stand-alone costs of serving that group, could one hope that entry or the threat of entry would prevent prices from rising higher. Alternatively, one can interpret the stand-alone cost ceiling as protecting any shipper or group of shippers from cross-subsidizing the railroad's other customers.

Calculating this limit is somewhat involved, even in the context of this stylized example. For our purposes, it will be sufficient to consider two SARR scenarios. The first assumes that the SARR consists of a newly constructed, least-cost link from A to C designed to carry only the captive shipper's traffic. The second assumes that the SARR carries BC O&D and BC link traffic in addition to the captive shipper traffic. It turns out that both scenarios yield the same outcome in terms of the maximum permissible AC rate under the Constrained Market Pricing methodology. Let us explain why this is the case.

**Scenario 1: A to C SARR, carrying only captive shipper traffic.** First, we need to determine the (annualized) unit costs for carrying the captive traffic. For simplicity, assume that (i) Railroad 1 is the low cost producer on the basis of average total cost;<sup>37</sup> and (ii) Railroad 1's costs are efficient.<sup>38</sup> Then the average total costs of the captive shipper's traffic would be:

$$p_{max} = ATC_{AC} = (F_1 + F_{1B} + F_A) / q_A + c_A + c_{1B}$$

This would be the CMP price ceiling for a captive shipper based upon a SARR that was constructed to carry *only* the traffic of the captive shipper.

**Scenario 2: A to C SARR, carrying BC-link and BC O&D traffic in addition to captive shipper traffic.** In this scenario, the costs would be the same as in Scenario 1, but the rate to the

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<sup>37</sup> Note that this does not conflict with our earlier assumption that Railroad 2 was the low cost producer based upon its average variable costs. The analysis would not change significantly if Railroad 2 was the end to end low cost producer based upon average total costs.

<sup>38</sup> Obviously, one of the purposes of the Constrained Market Pricing approach is to protect captive shippers from having to pay for the inefficiencies of the incumbent, just as would be the case in a hypothetical perfectly contestable market. That is why SARR costing methodologies are based upon forward looking engineering studies: i.e., they represent an attempt to determine the costs of the hypothetical railroad if it were built today using best practice technology. However, any divergence between the incumbent's actual costs and forward looking costs is an issue for CMP, regardless of where it is applied. That is, whether the SARR is used to set limits on end-to-end rates or limits on the access rate charged for use of the bottleneck portion of the route, there is an issue of how CMP should be applied.

captive shipper would be lower *if* either the BC-link traffic or the BC O&D traffic earned a contribution above variable costs. However, it is easy to see that no such contributions would be forthcoming in the posited situation. The reason is quite simple: in the presence of rail-on-rail contribution, price is driven down to the average variable cost of the most efficient provider, eliminating the contributions (if not the volumes) received by the other providers. In the base case, Railroad 1 could not earn any contribution on BC O&D traffic. The addition of another railroad (the SARR) can hardly be expected to improve the situation.<sup>39</sup> The situation is slightly different with respect to BC link traffic. In the base case, Railroad 1 was earning some contribution from carrying this traffic. However, with *two* railroads, Railroad 1 and the SARR, following essentially the same route, rail-on-rail competition would eliminate those contributions as well. Thus, while nothing prevents the designers of the SARR from attempting to capture complementary traffic, in the context of the present example, additional traffic will not result in a lower rate under CMP methodology.

### ***Stand-Alone Cost Ceilings for Bottleneck Access Rates***

Recent proposals have sought to combine the policies of mandated access with maximum rate regulation. That is, it has been proposed that the rate charged for access to a bottleneck facility be capped at a level determined by an application of the stand-alone-cost test for the bottleneck facility itself. At first blush, this may seem to be a reasonable extension of current practices. However, such a proposal would seriously undermine railroads ongoing struggle to achieve revenue adequacy *without* providing any significant efficiency advantages over the current system.

These issues can be readily analyzed in the context of the stylized railroad network introduced above. Under this proposal, the access rate would be determined by a stand-alone-cost calculation for

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<sup>39</sup> It would make no difference if we had assumed that Railroad 2 were the low cost end-to-end provider on the basis of average total cost. *One* railroad with Railroad 2's variable costs would earn a contribution on BC O&D traffic. However, two such railroads would compete it away.

the rail link AB. The access rate would be given by  $a_{max} = c_A + t + (F_{1A} + F_1)/q_A$ , where  $t$  is any additional per unit cost Railroad 1 incurs in granting access to Railroad 2. How would forced access for Railroad 2 at this rate affect market outcomes? First, note that competition for the AC traffic would now be possible between Railroad 1 and Railroad 2. As was the case with the BC O&D traffic, the result of this rivalry would likely be that the carrier with the lower per unit variable cost would carry the traffic at a price given by the unit variable cost of its rival. In this situation, the unit variable costs of Railroad 1 would almost certainly<sup>40</sup> be below those of Railroad 2 because the access charge includes the per unit fixed costs of the AB link and railroad overhead.<sup>41</sup> Thus, the post mandated access equilibrium price for the captive shipper's AC traffic would be equal to Railroad 2's unit variable costs for AC traffic: i.e.,  $p_A' = a_{max} + c_{2B}$ .

Thus it turns out that the comparison between cost-based mandated access and current CMP methodology is quite simple. Under mandated access, the captive shipper's rate falls from  $p_{max}$  to  $p_A'$ : i.e., by

$$p_{max} - p_A' = (F_1 + F_{1B} + F_A)/q_A + c_A + c_{1B} - (c_A + c_{2B} + t + (F_A + F_1)/q_A) = F_{1B}/q_A + [c_{1B} - (c_{2B} + t)].$$

The above equation reveals two sources for a decrease in captive shipper rates following a move to mandated access when that access is priced at average cost. First, the captive shipper rate no longer reflects a contribution  $(F_{1B}/q_A)$  toward recovery of the fixed costs of the BC link. Second, the CMP rate is higher by  $[c_{1B} - (c_{2B} + t)]$  because it does not reflect the competitive threat of Railroad 2 carrying the traffic over its BC link.

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<sup>40</sup> The per unit variable costs of Railroad 1 are  $c_A + c_{1B}$ , while those of Railroad 2 would be  $a_{max} + c_{2B} = c_A + t + (F_{1A} + F_1)/q_A$ . For the former to exceed the latter, would require that the BC unit variable costs of Railroad 2 exceed the per unit *total* costs of Railroad 1's BC link.

<sup>41</sup> There is some question as to whether any fixed costs other than those directly associated with link AB would be included in the calculation of the maximum access price. However, it is clear that they must be included for a proposal to be considered to be in the spirit of the stand-alone cost test. To leave general overhead costs out of the calculation would be to attempt to set ceiling costs on the basis of bottleneck *average incremental cost*, a notion without any theoretical foundation whatsoever.



### ***Policy Assessment***

At this point, it is useful to summarize the effects of mandated access on the various interested parties. The impacts are calculated under the assumption that the demand of the captive shipper is fixed at  $q_A$ . However, this is for expository purposes only. The effects would be approximately the same even if the captive shipper's demand for AC transport were elastic. This is because of the ability of railroads and large shippers to negotiate terms of contract carriage that can be expected to eliminate "distortions at the margin." That is, the result of bilateral negotiations between a captive shipper and a railroad can be expected to result in the maximization of joint profits. When the shipper's demand is price elastic, this will typically require that the last unit of traffic move at a price equal to marginal cost, with inframarginal payments made to make the contract profitable to the railroad. Thus, the ceiling prices calculated under either Constrained Market Pricing or cost-based mandated access do not determine the rates at which traffic actually moves. Rather, they determine the division of rents in the negotiated outcome.

**Captive Shipper.** The Captive Shipper gains an amount equal  $F_{1B} + \pi q_A$  in reduced shipping costs.

**Railroad 1.** Railroad 1 loses the identical amount due to the drop in price. The contribution of the traffic of the captive shipper falls by more than  $F_{1B}$ , the fixed and sunk costs associated with its BC link. Thus, Railroad 1 is further from revenue adequacy than in the initial situation.

**Railroad 2.** Railroad 2's profit position is not affected because, although its competitive threat is the key to lowering the equilibrium AC price, it is unlikely to be in a position to capture the traffic from Railroad 1.

The impact of mandated access is merely a transfer of wealth from the shareholders of Railroad 1 to the shareholders of the captive shipper. This should not in itself be of concern to policy makers

were it not for the fact that railroads, generally, suffer from an inability to generate revenues sufficient to maintain and expand their networks.

Access ceiling price regulation will be effective in reducing captive shipper rates precisely when the incumbent is most dependent on contributions from captive shipper traffic to achieve revenue adequacy. That is, in situations in which captive shipper contributions are required not only to cover the incremental fixed costs of the bottleneck *and* the overhead costs of the railroad, *but also* are required to help cover the fixed costs of competitive links.

### ***Economics of Negotiated Access***

This stylized rail network is rich enough to address access considerations in the status quo situation. Since we assumed that Railroad 2 operates more efficiently between B and C, it is natural to consider arrangements that would allow for the BC link of the A to C shipment to be carried by Railroad 2. One obvious solution would involve transshipment: i.e., transferring the cargo from Railroad 1 to Railroad 2 at B. However, the high costs of loading and unloading render this an impractical solution for bulk commodities. It would typically be more efficient for Railroad 2 to send its cars to A (with or without their locomotives). As above, suppose that the *additional* costs of coordinating and operating Railroad 2's cars over Railroad 1's AB link are  $t$  per unit. Then it would be efficient for Railroad 2 to carry the captive shipper traffic from B to C if and only if  $c_{1B} > t + c_{2B}$ . If this is the case, then the gains from shifting the captive shipper's  $q_A$  units of traffic to Railroad 2 for carriage from B to C is  $\mathcal{Z} = (c_{1B} - t - c_{2B})q_A$ .

Consider the result if it were left to the railroads to negotiate trackage rights themselves. First, note that the firms would tend to select the most efficient form of access. That is, if the advantages to Railroad 2 of sending its own locomotives to A outweighed the added costs to Railroad 1, then their agreement would reflect this. Indeed, negotiations between the railroads could be relied upon to

determine whether or not there were any gains from access at all once all relevant costs have been taken into account. If, in fact, there turn out to be efficiency gains available from granting trackage rights to Railroad 2, a negotiated agreement would serve to divide up these gains without reducing them. For example, at the margin, it is desirable for Railroad 2 to face the true marginal costs (i.e.,  $c_{1A}+t$ ) for use of Railroad 1's facilities. This would give it the appropriate incentive to develop additional traffic originating at or near point A. However, that rate would yield no contribution toward Railroad 1's overhead costs. In private negotiations, it is reasonable to expect that the firms would agree on a two part tariff (or similar nonlinear pricing schedule) that provided correct incentives at the margin for Railroad 2 while transferring revenues to Railroad 1 through lump sum (or other infra marginal) charges. Such nuances are extraordinarily difficult to reflect in regulated trackage rates.

For purposes of the discussion here, we shall continue to assume that the demand of the captive shipper is completely inelastic at the quantity  $q_A$ . In that case, negotiations can be completely described in terms of the per unit trackage/access price  $a$ . Initially, Railroad 1 earns a gross contribution of  $G_A = (p_A - c_A - c_{1B})q_A$ . After granting access to Railroad 2, the gross contribution would be  $G_a = (a - t - c_{1A})q_A$ . Clearly, Railroad 1 will benefit from the access agreement as long as  $G_a = (a - t - c_{1A})q_A \geq (p_A - c_A - c_{1B})q_A = G_A$ ; i.e., as long as  $a \geq (p_A - t - c_{1B})$ . Railroad 2's gross contribution from acquiring this traffic under these terms are  $G_{2A} = (p_A - a - c_{2B})q_A$ . Access at price  $a$  would add to Railroad 2's profits as long as  $G_{2A} \geq 0$ ; i.e., as long as  $a \leq (p_A - c_{2B})$ . Thus, *both* railroads would find it in their interest to agree to these terms as long as  $(p_A - c_{2B}) \geq a \geq (p_A - t - c_{1B})$ . For such an  $a$  to exist requires that  $c_{1B} \geq t + c_{2B}$ , which is precisely the condition under which it is socially cost efficient for Railroad 2 to move the captive shipper's traffic. It would generally be impossible to predict the precise outcome under a regime in which railroads were free to negotiate trackage rates. The firms would agree on a rate somewhere in the above range and the efficient outcome would result: i.e., Railroad 2 would carry the captive shipper traffic if its B to C costs were low enough.

The above analysis reveals that no regulatory intervention is required to achieve the cost efficient outcome in the typical bottleneck situation. If it is socially efficient for another carrier to complete the end-to-end movement, it will be in the interest of the owner of the bottleneck facility to negotiate access terms that will cause this to happen.

### ***Concluding Observations***

Railroads are multi-product firms that enjoy economies of density. The simple model of competitive equilibrium does not apply to the railroad industry. Railroads must charge prices greater than marginal costs if they are to cover their fixed costs. Various access proposals would result in prices that do not cover fixed costs. In the short run, the addition of competition to the market through new access would result in lower rates to shippers, but in the long run, mandated access would result in increased operating expenses, decreased railroad revenues, reduction in capital stock, loss of traffic through diversion, and greater costs to society as a whole.

We conclude that while “Open Access” would help some specific shippers realize lower rail rates, it is difficult to see what this radical change in American transport and regulatory policy would accomplish for the public interest. Are there serious dead-weight losses being born by the economy? If so, they are not well documented, and the regulatory authorities charged with determining whether abuses exist have not been especially sympathetic to rate protestants in “captive shipper” cases.

There are two quite different ways to think about the great divide between advocates of tighter regulation and those who support *laissez-faire* in American policy toward railroads: the first considers the debate as centered on different political preferences; the second realizes it is a struggle between economic interests. When regulation / deregulation is a broad political discussion, one side argues the public interest of promoting railroads to win extra-market benefits of public mobility, energy efficient

transport, or environmental protection (or the reverse – taxing them to balance budgets), while the other side takes the case for minimal government intervention.

In the second formulation, the divide between voices for regulation and against it exists not because of political philosophy but because of economic interests. The regulators want government intervention to counteract railroad monopoly market power; they may care hardly at all about railroad company profitability or ability to reinvest. The de-regulators want railroads to be able to charge what the market will bear in order to be profitable overall and to reinvest in capacity for future service.

While the positive benefits of mandated competitive access have not been established, the economic drawbacks of such a policy are plain to see and costly to ignore. Compelled access really would amount to “re-regulation,” as the railroads warn. Some official body would have to determine what circumstances warrant such deliberate governmental intervention, what dispatching and liability terms are appropriate, and what fees should be paid to the reluctant “host.” These are Coasian transaction costs of a very high order. If, for any reason, the owning railroad is denied adequate trackage fees or compensation for the taking of its property, it will be unable to reinvest in the physical infrastructure which facilitated not only the compelled access at issue, but also the assets used in providing low cost rail service to countless other beneficiaries, private and public.

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