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Surface Transportation Board

*An Examination of the STB's Approach to Freight Rail
Rate Regulation and Options for Simplification*

Project FY14-STB-157



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Abbreviations Used

3B	Three-Benchmark Test
3R Act	Regional Rail Reorganization Act of 1973
4R Act	Railroad Revitalization and Regulatory Reform Act
AC	Average costs
ACCC	Australia Competition and Consumer Commission
ARTC	Australian Rail Track Corporation
ATC	Average Total Cost
BNSF	Burlington Northern and Santa Fe Railway Company
BPW	Baumol, Panzar and Willig
CLR	Competitive Line Rates
CMP	Constrained Market Pricing
COAG	Council of Australian Governments
Conrail	Consolidated Rail Corporation
CTAR	Canada Transportation Act Review
DCF	Discounted Cash Flow
DOT	Department of Transportation
ECPR	Efficient Component Pricing Rule
ELRA	Enterprise Level Revenue Adequacy
EP	Ex Parte
FCC	Federal Communications Commission
FERC	Federal Energy Regulatory Commission
FOA	Final Offer Arbitration
GAO	Government Accountability Office
ICAct	Interstate Commerce Act
ICC	Interstate Commerce Commission
ICCTA	ICC Termination Act of 1995

LEC	Local Exchange Carriers
LRVC	Long Run Variable Costs
M-ECPR	Market determined efficient pricing rule
MMM	Maximum Markup Methodology
ORR	Office of Rail and Road
PRB	Powder River Basin
RBROR	rate-base rate-of-return
RCAF	Rail Cost Adjustment Factor
RPI	Road Property Investment
RSAM	Revenue Shortfall Allocation Method
R/VC	Revenue/variable cost
R/VC _{COMP}	Revenue/variable cost of comparable traffic
R/VC _{>180}	Revenue/variable cost of comparable traffic of potentially captive shippers
SAC	Stand Alone Cost
SARR	Stand-Alone Railroad
Simplified-SAC	Simplified Stand-Alone Cost
STB	Surface Transportation Board
TC&W	Twin Cities & Western Railroad Company
TELRIC	Total Element Long Run Incremental Cost
TSLRIC	Total Service Long Run Incremental Cost
TRB	Transportation Research Board
UP	Union Pacific Railroad Company
URCS	Uniform Railroad Costing System
USC	United States Code
USRA	United States Railway Association
WFA	Western Fuels Association, Inc.
WGTA	Western Grain Transportation Act

Executive Summary

Introduction

The Surface Transportation Board (STB or the Board) exercises economic regulatory oversight over certain surface transportation matters. One of the STB’s statutory duties is to adjudicate complaints brought by shippers seeking reductions in railroad transportation rates. For rail traffic that is subject to the STB’s rate jurisdiction, the STB’s governing statute requires that rates be “reasonable.” The Board does not have jurisdiction over the reasonableness of a rate for rail transportation unless the rail carrier providing the service has “market dominance” in that particular market. Market dominance exists when there is “an absence of effective competition from other rail carriers or modes of transportation for the transportation to which a rate applies.”¹ The statute explicitly recognizes that competitive alternatives can comprise both intra-modal competition (another railroad) and inter-modal competition (e.g., trucks, ships, barges, pipelines, etc.). Moreover, by statute, a railroad is not considered to have market dominance unless the revenue produced by the rate is greater than 180% of its variable cost of providing the service (R/VC Ratio, or $R/VC_{>180}$) as determined under the STB’s Uniform Rail Costing System, known as “URCS.”²

The process through which STB determines the reasonableness of rates is complex. Under the regulatory regime established by Congress, the basic challenge to the Board is to estimate what a reasonable rate would be were a competitive market to exist. Complaining customers must develop detailed evidence to calculate both direct operating expenses (such as the cost of locomotives, crew, and railcars) and indirect operating expenses (such as maintenance of way) of a hypothetical railroad designed to serve its traffic. If the complaining shipper can show that the revenues earned by the defendant from serving the entire traffic group exceed what it would cost to build and operate the hypothetical railroad (including a reasonable profit), then the STB determines the specific relief, if any, to which the complaining shipper is entitled.

In response to complaints from the shipper community and Congress about the complexity (and thus the cost) of seeking regulatory relief, and Congressional direction in the ICC Termination Act of 1995 to complete a rulemaking initiated by the STB’s predecessor agency “to establish a simplified and expedited method of determining the reasonableness of challenged rates” in for smaller cases,³ the STB implemented simplified procedures for determining rate reasonableness when the agency’s original procedure was too costly, given the value of the case.

In 2014, the STB decided to request the services of an outside expert consultant to examine alternatives to the Board’s existing methodologies for railroad rate regulation. The investigation was to include a review and evaluation of other rate regulation methodologies used by regulators of network industries. The STB also sought recommendations regarding how it could employ any relevant and practicable rate regulation methods.

¹ 49 U.S.C. § 10707(a).

² 49 U.S.C. § 10707(d)(1)(A).

³ 49 U.S.C. § 10701(d)(3).

Ongoing interest in the possibility of providing an additional path to potentially lower rates through competitive access motivated a request to expand the study to include an analysis of means for regulating access charges to bottlenecks – railroad segments that are controlled by one carrier with exclusive access to either a shipper or consignee.

This report is a response to the STB mandate for an investigation and analysis. Its objectives are as follows:

- Review available academic and legal literature addressing the STB’s rate regulation methodology and conceivable alternatives;
- Determine the applicability of alternative methods of rate regulation or competitive-access pricing that could be used by the STB; and
- Provide the STB with detailed recommendations for how it could deploy alternative methodologies to reduce the time, complexity and expense historically involved in the litigation and resolution of rate reasonableness complaints while producing outcomes that are fair and reasonable to railroads and complaining shippers.

Legislative and Regulatory Context

Federal oversight of freight rail rates has existed since 1887, when the Congress enacted the Interstate Commerce Act to protect shippers from the monopoly power of the rail industry. That act created the predecessor to the STB -- Interstate Commerce Commission (ICC) -- to provide regulatory oversight. By the 1970s, American freight railroads were in a serious financial decline. The Congress responded by passing three pieces of major legislation with the overall goal of revitalizing and stabilizing the railroads’ financial health, and establishing a more flexible regulatory regime that placed primary reliance on competition. Arguably the most important of those laws was the Staggers Rail Act of 1980 (Staggers Act), which provided a framework for the deregulation in the railroad industry.

The Staggers Act clearly stated federal policy with respect to railroads and rail regulation. Among the several policies specifically mentioned were the following:

- (1) to allow, 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 Interstate Commerce Commission;*

Among the major changes introduced by the Staggers Act, the most important was the removal of the inefficient regulation of rate levels by commodity. The Staggers Act permitted railroads to freely set rates and to enter into confidential contracts with shippers. By deregulating the industry, the Congress effectively allowed the railroads to become responsible of their own performance. At the same time, however, the Act provided shippers with a regulatory mechanism to protect them from unreasonable rates where market dominance existed. Under the Staggers Act, for market dominance to exist, the revenue-variable cost ratio of the disputed service must exceed 180 percent. (The original 160 percent threshold was increased to 180 percent in 1984.) The statute expressly provides that 180 percent is a threshold only, and meeting it does not prove market dominance. Therefore, the complainant must also

demonstrate the absence of effective competition from other rail carriers or modes of transportation.⁴ Only after market dominance was established would the rate be examined to determine if it was unreasonably high.

The ICC published a set of economic principles to determine whether rates charged by market dominant railroad that are challenged by shippers are unreasonable. These were the “Constrained Market Pricing” (CMP) principles that were published in the ICC’s “*Coal Rate Guidelines, Nationwide*” in 1985. The CMP principles are designed to prevent “captive” shippers from paying more than is necessary for the carrier involved to earn adequate revenues, from paying for inefficient service, and from bearing the cost of facilities or services from which they derive no benefit. The CMP principles recognized the importance of “Ramsey pricing” in the context of economies of scale and high fixed and common costs by allowing railroads to price above marginal cost.⁵ The ICC viewed the CMP principles as “meet[ing] our dual objectives of providing railroads the real prospect of attaining revenue adequacy while protecting captive coal shippers from ‘monopolistic’ pricing practices.”⁶

The CMP principles represent an operational solution to implement differential pricing based on Ramsey pricing principles. CMP is conceived as three possible constraints that a shipper may advocate to limit the rates charged by a railroad for movements where the carrier is market dominant:

- The Revenue-Adequacy Constraint: This constraint reflects the need for the STB, when considering the reasonableness of the rate, to bear in mind that the rate must be adequate to allow the railroad to earn revenue sufficient to cover costs, make normal profit and attract capital;
- The Management Efficiency Constraint: This constraint prevents customers from paying avoidable costs that result from the inefficient operation and management of a railroad;
- The Stand-Alone Cost (SAC) Constraint: This constraint protects customers from bearing the cost of inefficiencies or cross subsidizing other services. This constraint intends to ensure that the revenue that a railroad earns does not exceed the total cost that a hypothetical, efficient railroad would incur in providing the same service or group of services. In short, the stand-alone constraint is designed to protect captive shippers from undue exercise of market power.

The SAC concept was first described by Gerald Faulhaber in 1975. The original concern was to define a criterion to identify whether a group of consumers of a public multi-product firm was being cross-subsidized by another group of consumers.⁷ In 1983, Baumol and Willig further articulated these concepts in the context of the U.S. rail industry.⁸

⁴ 49 U.S.C. § 10707(d)(2).

⁵ “Ramsey pricing” is an economic tenet sometimes referred to as differential pricing which allows firms to fix their prices above their marginal cost to cover their common and fixed costs by pricing their products higher when there is less elasticity of demand.

⁶ *Coal Rate Guidelines, Nationwide*, 1 I.C.C. 2d 520, 6 (1985), *aff’d sub nom., Consol. R. Corp. v. ICC*, 812 F. 2d 1444 (3d Cir. 1987) (“*Coal Rate Guidelines*”).

⁷ Faulhaber, Gerald R. “Cross-Subsidization: Pricing in Public Enterprises.” *The American Economic Review* 65, no. 5 (1975): 966-977.

⁸ Baumol, William J. and Robert D. Willig. “Pricing Issues in the Deregulation of Railroad Rates.” In *Economic Analysis of Regulated Markets*, ed. Jörg Finsinger, 11-47. London: McMillan, 1983.

By 1995, the substantial deregulation of the rail industry was largely complete. In a further effort to limit federal economic regulation of surface transportation, Congress passed the ICC Termination Act of 1995, which abolished the ICC, but transferred most of the ICC's railroad regulatory responsibilities to the newly created Surface Transportation Board (STB).

STB's Rate Regulation Procedures

The ICC described its Stand-Alone Cost (SAC) procedure for assessing rate reasonableness in *Coal Rate Guidelines* (1985). This original SAC procedure, or "Full-SAC," is the principal regulatory process that permits railroad customers to seek relief from rates that they believe are unreasonable and to determine if prevailing rates reflect an incumbent railroad's inefficiencies or the cost of railroad facilities from which they derive no benefits.

To determine if a rate is reasonable under the Full-SAC test, a shipper must determine the lowest cost at which a hypothetical, fully efficient "stand alone railroad" (SARR) could provide the service at issue free from any costs associated with inefficiencies or cross-subsidization. If the rate required to cover these costs (taking into account a reasonable return for the railroad) is less than the disputed rate, then the disputed rate may be considered to be unreasonable.⁹

The process begins with the railroad customer defining a hypothetical SARR which could serve the traffic if the market was free from entry and exit barriers. This hypothetical SARR is designed to replicate the conditions of a contestable market. By simulating a contestable market, the Full-SAC procedure approximates the maximum rate that would be charged to the shipper in a competitive environment.

While the Full-SAC procedure is considered to be precise as a mechanism for determining the reasonableness of challenged rail rates, it is highly complex and is often a multi-million dollar exercise. In a Full-SAC test, estimations of variable costs and investment are typically developed from models and studies. This methodology, straightforward and intuitive in theory, evolved into an elaborate, time consuming and expensive process in practice.

Consequently, the STB issued *Simplified Guidelines* to assess rate reasonableness on captive traffic for which the CMP guidelines could be practicably applied.¹⁰ The *Simplified Guidelines* were intended to decrease the cost of the litigation while still relying on the CMP principles. The challenge for STB was to balance the need for sound economic criteria with the necessity to simplify the calculation process to reduce the cost of the procedure. The approach was based on a comparison between the revenue/variable cost ratio (R/VC) of the traffic at issue and a combination of Three-Benchmark ratios:

- The Revenue Shortfall Allocation Method (RSAM). This measure approximates the rates necessary for a railroad to become revenue-adequate. This measure is computed and reported annually by the STB.

⁹ *Major Issues in Rail Rate Cases*, Ex Parte No. 657 (Sub-no. 1) (STB served Oct. 30, 2006) ("*Major Issues*").

¹⁰ *Rate Guidelines – Non-Coal Proceedings*, Ex Parte No. 347 (Sub-no. 2) (STB served Dec. 27, 1996), 1 S.T.B. 1004 (1996) ("*Simplified Guidelines*").

- R/VC_{COMP} : The ratio of the revenue to variable cost ratio for comparable traffic, based on movements sharing the same characteristics with the traffic at issue. This measure is intended to provide a means of reflecting demand-based differential pricing principles.
- $R/VC_{>180}$: The ratio of revenue to variable costs over 180 percent ratio measures the average markup over variable cost earned on potentially captive shippers by the defendant railroad. This benchmark measures the degree of differential pricing actually being practiced by that carrier.

The “Three-Benchmark Procedure” has been criticized on several grounds, including claims that it lacks theoretical support, is too simple to take into account the unique demand characteristics of each movement, and is still too complex and costly for shippers of certain commodities, particularly grain. Since the introduction of the Simplified Standards, only one Three-Benchmark case has been litigated to a final STB decision and four were settled.

In reaction to the unexpectedly low level of usage, the Board held public hearings to hear the concerns of stakeholders and to understand why shippers so seldom used the simplified procedure. Concluding that “the shipper community perceives [the Simplified Guidelines] as too vague, and as requiring prolonged litigation over whether a shipper even qualifies to use them,”¹¹ the Board proposed new Simplified Standards, which revised the existing Three-Benchmark procedure and created a new simplified procedure called the Simplified Stand-Alone Cost (Simplified-SAC). The Simplified-SAC procedure is similar to a Full-SAC approach, but adopted many simplifying assumptions and standardization measures to streamline the process and decrease the litigation cost for shippers. The simplifications included assumptions regarding the route over which the traffic would move, the SARR’s facilities, the traffic group, and cross-over traffic.

Consequently, the Simplified-SAC procedure has been criticized for preserving existing inefficiencies in the operating cost structure of railroads serving the traffic at issue because historical URCS data is used in the cost formulations. All five cases involving the Simplified-SAC methodology were settled before the procedure could be tested.

Applying the Three-Benchmark and Simplified-SAC Tests to Settled Cases

The project team examined two cases that had previously been presented and decided based on Full-SAC analyses. The team’s re-examination sought to determine whether use of either the Three-Benchmark procedure or the Simplified-SAC would yield outcomes that were consistent with the analyses and findings of a Full-SAC test. Two past cases were selected, each with different outcome concerning rate reasonableness.

- In *Otter Tail Power Company v. BNSF Railway Company*, although market dominance was uncontested, the Board found that Otter Tail failed to demonstrate that the challenged rates were unreasonably high.¹²

¹¹ *Proposed Rule, Simplified Standards for Rail Rate Cases*, Ex Parte No. 646 (Sub-No. 1), slip op. at 3 (STB served Jul. 28, 2006). The STB issued its Final Rule in a decision served in the same docket on September 5, 2007 (“*Simplified Standards*”).

¹² *Otter Tail Power Co. v. BNSF Ry.*, NOR 42071 (STB served Jan. 27, 2006) (*Otter Tail*).

- In *Western Fuels Association, Inc. and Basin Electric Power Cooperative v. BNSF Railway Company*, the Board determined that the rates charged were unreasonable.¹³

To compare the results of the three methods for these two cases, the *Simplified Standards* were adapted to simulate the outcomes of rate reasonableness complaints in *Otter Tail* and *Western Fuels* if the complaining shippers had utilized the Three-Benchmark or Simplified SAC procedures rather than Full SAC. The analysis must be viewed as provisional as it has not undergone the rigorous scrutiny of an actual rate case hearing before the STB. For example, in an actual Three-Benchmark case, both the railroad and shipper can propose adjustments to the rate determined by the methodology based on “other relevant factors.” No such adjustments were applied here.

Adaptation of the Three-Benchmark Procedure

The team adapted and applied the Three-Benchmark method to simulate how shippers and the Board might have estimated the maximum allowable rate under the Three-Benchmark method and to assess whether or not the analysis would provide the same conclusion as the Full-SAC analysis. The first step in all of the rate relief methodologies was to compute the revenue to variable cost ratios for the issue traffic. Two different revenue shortfall allocation calculations were used, based on the methodologies that were applicable before and after 2007, when the STB changed how it calculated the measure. Different ratios were calculated, reflecting variations in distance traveled, rail car ownership, and rail car type. For the *Western Fuels* example, variations also reflected different points of origin, because there were five separate mine origin/destination pairs in this case.

Otter Tail. While the pre-2007 methodology would not have provided a clear outcome for the *Otter Tail* case, the results based on the most recent Simplified Standards suggest that the outcome of the Three-Benchmark would have been the same as the actual STB decisions using the Full-SAC test: Both the Full-SAC proceeding and the project team’s re-examination using the adapted Three-Benchmark method did not find that the challenged rates were unreasonably high.

Western Fuels. The project team’s adaptation of the Three-Benchmark approach yielded conclusions that were similar to those reached using the Full-SAC case when using the most recent methodology. Based on the Western Fuels Association’s adjusted revenue to variable cost ratios, the adapted Three-Benchmark would suggest that the rates are unreasonable, because the ratios of the traffic at issue would be higher than the Three-Benchmark test.

Adaptation of the Simplified-SAC Procedure

Once the Board determines that market dominance has been shown, the first step in a Full-SAC or a Simplified-SAC proceeding is to determine the traffic group to be analyzed. For its re-examination of these cases under a Simplified-SAC test, the project team sought to determine what the total traffic would have been at the time of the case. Because the team lacked access to the carrier’s data, it estimated this traffic based on case filings. To estimate the operating expenses of the SARR, the project team used URCS data from STB to make needed modifications as per *Simplified Standards*. The team estimated the road property investment expenses based on past cases, and completed the discounted cash flow

¹³ *Western Fuels Ass’n, Inc., and Basin Elec. Power Coop. v. BNSF Ry.*, NOR 42088 (STB served Feb. 18, 2009) with technical corrections (STB served Jun. 5, 2009) (“*Western Fuels*”).

analysis using the exact parameters used at the time of the case (inflation, traffic projection, cost of capital, depreciation schedule, etc.).

The analysis of Simplified-SAC also produced results consistent with the Full-SAC procedure for the *Western Fuels* case, confirming that BNSF rates were unreasonable. The analysis was unable to come to a full conclusion for the Otter Tail Power case due to the inability to re-create the Road Property Investment component of the analysis with simplified SAC methodologies. However, based on operating cost data, conclusions were found consistent with the STB decision.

Alternatives to Maximum Rate Regulation: Lessons from Other Countries

Other countries have adopted different regulatory regimes for their freight rail industries. The project team examined these alternatives to determine whether they might offer options for the U.S.

Canada

The National Transportation Act of 1987 removed the maximum rate regulation provision and instead relied primarily on commercial negotiation of contracts between carriers and shippers to constrain rates, and created a provision for commercial arbitration of railway rates. If a shipper is unsatisfied with a rate charged by a carrier, it applies to the Canada Transportation Agency to designate a commercial arbitrator to choose the final rate/service offer of either the carrier or the shipper. The arbitrator can choose one offer or the other but cannot create any other rate (such as splitting the difference). Decisions made by the arbitrator are not made public, and reasons are not given by the arbitrator to either the parties (carrier and shipper) or to the government. Because it is non-transparent, it is our opinion that the Canadian final offer arbitration process provides no guidance for alternatives to SAC. Even if sound economic analysis is applied, because the process is confidential, no guidance can be identified or developed.

Canada's rail regime allows for interswitching, which requires the originating carrier for a specific shipper to pick up and switch a shipment to another carrier's line if the switching distance was relatively short. Because the methodology used to calculate the rate is distance-based, and given that the STB rejected use of distance-based fully allocated cost as a basis for maximum rate regulation, it is our opinion that the Canadian interswitching methodology provides no insight for the STB on potential revision to or replacement of SAC.

Canadian law also allows a shipper to seek a competitive line rate (CLR). CLRs allow qualifying shippers served directly by only one carrier to obtain a regulated rate on the originating carrier from origin to the closest interchange point with another railway (which would complete the origin-destination movement). The methodology for establishing the CLR is not cost-based, but rather based on the originating carrier's system average revenue per ton-mile for similar traffic. Because it is based on system average revenues, not costs, and will embed revenue inadequacy, and conversely could embed above normal returns for a carrier, it is our opinion that the CLR provides no insight to STB on a possible replacement of the SAC test.

United Kingdom

The UK's rail system is fundamentally different from that in the U.S. and Canada. There is a nationalized track company, Network Rail, and a number of competing "above-the-rail" operators (i.e., train operators such as Great Western, Virgin Trains, and London Midland). Rail regulation is the responsibility of the Office of Rail and Road (ORR), formerly the Office of Rail Regulation. All railroad infrastructure and some railway stations in the UK are owned by Network Rail, an arm's-length government monopoly that is

accountable to the ORR, Parliament, and the Secretary of State for Transport.¹⁴ Above-the-rail train operators seeking access to Network Rail track to run freight trains must apply to the ORR for a track access agreement. It is our view that the UK approach, based on a nationalized track operator which is heavily subsidized, is of limited relevance to the U.S. ORR once used stand-alone cost to assess maximum track access rates, but found it to be irrelevant since SAC rates were well above the subsidized rates.

Australia

Australia's rail system is similar to that found in the UK, where the majority of the interstate rail network is owned or leased by the vertically-separated Australian Rail Track Corporation (ARTC), whose shares are owned by the Australian government. State-owned railways or private above-the-rail train operators lease track "windows" to operate trains. Access charges of ARTC can be regulated by the Australia Competition and Consumer Commission. Australia's regulatory system is further complicated because there are separate access regimes operated by each Australian state for access to publicly owned, vertically integrated intra-state rail lines. State regulators are responsible for regulation of access fees paid by above-the-rail operators in such situations. Maximum rate regulation is guided by stand-alone cost principles for a single shipper or a group of shippers. The regulation process is multiyear and involves a myriad of steps and decisions. It is our assessment that the Australian experience reinforces some of the key economic principles underlying the STB's CMP, while providing no insight for simplification of the SAC methodology.

Alternatives to Maximum Rate Regulation: Lessons from Other Network Industries

A regulatory system based on an access regime, where the access prices charged by one carrier to another, may provide an alternative to maximum rate regulation. Theoretically, access regimes can be calibrated to provide for a reasonable return on investment for host networks, while simultaneously encouraging competition and efficiency. Two potential tools for regulating the price of access were identified:

- Total Element Long Run Incremental Cost (TELRIC): The pricing approach adopted by the Federal Communications Commission (FCC) in the telecommunications industry; and
- Efficient Component Pricing Rule (ECPR): This technique compensates a host railroad (or network) for the incremental cost of allowing access to its bottleneck segment of track and for the net opportunity cost of foregone revenue related to providing access.

¹⁴ The U.K. government reclassified Network Rail in 2014 from a private company to an "arm's-length central government body," meaning the company is now a public company. "Arm's-length" refers to it not being a government department, but still being accountable to the government. "An arm's-length body is an organisation that delivers a public service, is not a ministerial government department, and which operates to a greater or lesser extent at a distance from Ministers." Public Administration Select Committee, "Who's Accountable? Relationships between Government and Arm's-Length Bodies," United Kingdom House of Common, First Report of Session 2014-15, Nov. 10, 2014.

<http://www.publications.parliament.uk/pa/cm201415/cmselect/cmpubadm/110/110.pdf>

Some have proposed use of one or the other of these methodologies as an alternative or complement to maximum rate regulation on routes where the railroad is found to be market dominant. The report examines these methodologies and discusses whether the underlying regulatory pricing principles could be applied to rail rates paid by shippers as a simpler alternative to CMP.

The report also examines the suitability of an access type of regulation now employed by the Federal Energy Regulatory Commission (FERC) to the interstate transmission of electricity and natural gas. In both of those industries, the federal government sought to increase the competitiveness of the energy markets by requiring industries that had historically been highly vertically integrated to “unbundle,” or separate, their sales and transmission services. By doing so, the government sought to encourage greater innovation and efficiency in the production of energy and allow consumers to benefit from more competitive and cheaper providers.

Federal Regulation of Interstate Electricity and Natural Gas Distribution

FERC is the independent federal agency that regulates interstate transmission of electricity and natural gas.¹⁵ FERC has exclusive jurisdiction over the “transmission of electric energy in interstate commerce,” and over the “sale of [electric energy] at wholesale in interstate commerce.”¹⁶ FERC also regulates natural gas pipeline transportation rates and services. Under authority originally granted in 1938, FERC has the authority to set “just and reasonable rates” for interstate transmission of natural gas.

Electricity. The market for electricity has evolved considerably over time. Decades ago, electric utilities were mostly vertically integrated firms that constructed and operated their own generation, transmission, and distribution facilities. Rates paid by consumers were subject to approval by local or state public utility commissions. Over time, utilities built major interconnecting transmission lines large enough to deliver power in case of a major generator outage. Technological advancement brought the possibility of cheaper sources of power. However, the potential consumer benefits that could be derived could be realized only if more efficient generating plants could obtain access to regional transmission grids. Vertically integrated companies did not offer open access to new entrants.

One goal of the 1992 Energy Policy Act¹⁷ was to promote greater competition in bulk power markets by encouraging new generation entrants. In 1996, FERC required each public transmission providers to functionally unbundle its wholesale generation and transmission services and file an open-access transmission tariff containing minimum terms of non-discriminatory transmission service.¹⁸

¹⁵ FERC was established in 1977 in the Department of Energy Organization Act (91 Stat. 565; 42 U.S.C. § 7101). The predecessor regulator was the Federal Power Commission, which had originally been established in 1920 to coordinate hydroelectric projects under federal control. FERC’s authority to regulate the transmission of natural gas originated in the Natural Gas Act of 1938, 15 U.S.C. § 717 *et seq.* The Natural Gas Act gave these regulatory powers to the Federal Power Commission, and those powers transferred to FERC in 1978.

¹⁶ 16 U.S.C. § 824.

¹⁷ *Energy Policy Act of 1992*, Pub. L. No. 102-486, 106 Stat. 2776-3133 (1992).

¹⁸ Federal Energy Regulatory Commission, “Promoting Wholesale Competition through Open Access Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities,” 61 Fed Reg. 21541, 21551-21552 (May 10, 1996), <https://www.gpo.gov/fdsys/pkg/FR-1996-05-10/pdf/96-10694.pdf>

FERC uses rate-base rate-of-return regulation (RBROR) to regulate transmission providers and ensure they earn reasonable rates of return on their investments. The transmission companies use various forms of pricing to recover their costs of providing service and earn a return on the investment in infrastructure within a service territory. Rates can be zone specific (license plate pricing), depend on the distance (point to point sensitive), or be the same whatever the distance (postage stamp pricing).¹⁹ Postage stamp pricing is a form of uniform pricing method applied in a defined area.

FERC can reject rates if they are found to be “unjust and unreasonable” or “unduly discriminatory and preferential.”²⁰ FERC can review rate filings independently or after receiving a complaint. To be deemed just and reasonable, rates need to be cost-justified or market justified. Complainants must show that the return on equity (ROE) is outside a range defined by a lower and an upper band ROE computed using FERC’s preferred discounted cash flow model.

Natural gas. The natural gas industry is composed of three major segments--production, transmission, and distribution.

- The production segment is made up of natural gas producers who explore for and extract gas from the ground.
- The transmission sector consists of pipelines, or transmission companies, that historically purchased natural gas from producers or other suppliers, and then transported and sold and delivered the gas to other pipelines, distributors, or customers. Pipelines may transport gas within the boundaries of a single state (intrastate) or between states (interstate).
- The distribution sector consists of local distributors, primarily local public utilities that purchase natural gas from pipelines. These distributors then resell the gas to end-users, such as residential, commercial, or industrial customers.

For many years, the industry functioned with separate intrastate and interstate markets. Natural gas was somewhat cheaper in the interstate market as a result of wellhead price regulation under the Natural Gas Act. But many producers refused to commit all of their gas to the interstate market. Based on proximity and the absence of wellhead price regulation, industries reliant on natural gas chose to locate in gas producing states and obtain supplies through intrastate pipelines. In response to a national shortage of natural gas in the 1970s, particularly in the interstate market, and subsequent Congressional action reforming and ultimately eliminating wellhead price controls, FERC required interstate pipeline companies to unbundle, or separate, their sales and transportation services. This allowed distribution companies to purchase gas directly from producers and pay the pipeline companies to transport the gas. Unbundling was intended to increase competition among gas sellers and diminish the market power of pipeline companies.

¹⁹ The Regulatory Assistance Project, “Electricity Regulation in the US: A Guide” (2010): 67
<http://www.raonline.org/document/download/id/645>

²⁰ 16 U.S.C. § 824(d).

Similar to its requirements with electricity transmission providers, FERC requires natural gas pipelines to offer transmission services on a non-discriminatory basis.²¹ Pipelines must file with the FERC their proposed tariffs, which are calculated on an RBROR basis. FERC sets the maximum rates for each pipeline separately.²² Whenever a new rate or change to a rate is needed, the company must complete a submission to FERC for approval. Customers can also file complaints with the FERC, which considers complaints on a case-by-case basis.

Suitability for Freight Rail Regulation. Federal regulation of electricity and natural gas transmission is not an appropriate method to consider as an alternative for the U.S. rail industry.

Most importantly, FERC's regulatory approach represents a departure from CMP principles. Adopting some form of Rate Based Rate of Return regulation similar to what FERC applies would represent a step away from economic efficiency. Some form of pricing in electricity transmission such as the postage stamp pricing allows the transmission company to recover its costs uniformly leading to potential cross-subsidies. If such a rate-making approach was used in the U.S. railroad industry, some shippers would bear a share of cost that is higher than the benefit they receive. Moreover, FERC's regulatory processes require a higher level of oversight compared to that applied in the U.S. in its regulation of railroads. Further, the agency's case-by-case approach to price regulation seems to be inconsistent with the Staggers Act, which emphasizes relying on market-based solutions whenever possible.

TELRIC

The Telecommunications Act of 1996 required the incumbent providers of local telephone service (primarily the "Baby Bells" created after the breakup of AT&T) to open their networks to competition at the retail level by leasing portions of their networks to new entrants. Congress tasked the FCC with developing a rate methodology under which the charges to the new entrants would obtain access to the lowest reasonable cost. The pricing principle adopted by the FCC --TELRIC -- is a forward-looking, cost-based methodology that attempts to allocate to the new entrant its share of the costs of hypothetical network that would employ the most efficient technology for reasonably foreseeable capacity requirements. It omits Ramsey pricing considerations integral to CMP principles used by the STB in railroad rate regulation and assumes that the financial health of the incumbent carriers leasing portions of their networks would not be adversely affected.²³ This contrasts with a major legislative goal of the Staggers Act to promote the financial health of U.S. railroads.

Efficient Component Pricing Rule (ECPR)

In contrast, the ECPR measure reflects an incumbent's net opportunity costs of providing access. This includes the revenue foregone from lost traffic and, by implication, invokes the Ramsey pricing principles implicit in modern U.S. railroad ratemaking. Some have argued that ECPR conforms to Ramsey principles because it provides a means of pricing access that makes the host railroad whole with respect

²¹ Viscusi et al., *Economics of Regulation and Antitrust, Fourth Edition* (Cambridge, Massachusetts: The MIT Press, 2005), 684.

²² "How Are Pipelines Regulated?" Interstate Natural Gas Association, <http://www.ingaa.org/cms/143.aspx>

²³ Federal Communications Commission, *First Report and Order*, In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996 CC Docket No. 96-98 and Interconnection between Local Exchange Carriers and Commercial Mobile Radio Service Providers, CC Docket No. 95-185, FCC 96-325, Adopted August 1, 1996, 7.

to its opportunity costs. Critics argue that the opportunity cost element of ECPR potentially preserves monopoly rates and related inefficiencies that were embedded in opportunity cost.

In 1996, J. Gregory Sidak collaborated with Daniel F. Spulber advanced the concept of the “market-determined efficient component pricing rule” or M-ECPR, which took forward-looking alternative access costs into account.²⁴ The difference between ECPR and M-ECPR lies in its constrained interpretation of an incumbent’s opportunity cost. In cases where there are no actual and potential market alternatives to using the incumbent’s bottleneck segment, that incumbent’s contribution is the relevant measure of opportunity cost for ECPR. However, where existing or potential market alternatives exist, the price of those alternatives becomes the relevant measure for calculating ECPR opportunity costs.

Modeling the Application of TELRIC and ECPR to U.S. Freight Rail Cases

The project team applied both methodologies to the *Otter Tail* and *Western Fuels* cases. Both applications required numerous simplifying assumptions.

TELRIC. This analysis tested the likely outcomes of TELRIC-based rail regulation by solving for implied TELRIC rates for the *Otter Tail* and *Western Fuels* cases, using URCS to estimate costs attributable to the traffic at issue. Three sensitivities were tested for the markup over unattributable or shared costs of the movements. The project team’s calculations of these sensitivities produced results that varied widely. All three combinations resulted in cost markups below those demonstrated in the two Full-SAC cases. The results could be interpreted as being consistent with a methodology that aims to promote entry and competition, but not revenue adequacy.

In light of the different legislative mandate given by the Congress to STB and the FCC, the project team concluded that TELRIC has little applicability to the U.S. railroad industry. A railroad application of TELRIC would potentially impede operators’ ability to recover common costs and reduce financial viability. Further, its implementation would require legislative action. Although TELRIC, as an access pricing methodology, could be adapted to replace SAC for determination of maximum allowable rates to be paid by railroad customers, the resulting adaption would have similar complexity to SAC.

ECPR. This investigation sought to determine if ECPR-based access pricing might indicate that a viable competitive alternative were potentially available. Shippers’ rates were held constant and carrier costs were adjusted to include ECPR access prices, including the landlord’s full opportunity cost. In the *Western Fuels* case a small negative contribution resulted for the new entrant carrier, from which it was inferred that sustainable competition would have not have resulted from a constrained bottleneck price . In the *Otter Tail* case, a similar analysis found that ECPR-based access pricing for the short 24-mile bottleneck segment, with the unconstrained opportunity cost and without offset for alternative uses of crews and equipment, implied a significant loss. In other words, the price that would be extended to the shipper by the competitive alternative could not be less than that offered by the incumbent.

The M-ECPR approach, which limited the price of access to the cost of building a “market alternative” connecting track, was applied using the *Otter Tail* case data using both SAC and Simplified-SAC construction cost estimates. The results suggested that the M-ECPR could have provided a positive

²⁴ Sidak, J. Gregory, and Daniel F. Spulber, *The Tragedy of the Telecommons: Government Pricing of Unbundled Network Elements Under the Telecommunications Act of 1996*, 97 Colum. L. Rev. 1081 (1997).

contribution to the new entrant's fixed cost, providing potentially, sustainable competition. The study team concluded that in cases where a potential market alternative is identified, additional contribution might be attracted. Still, under M-ECPR and ECPR, any rate incorporating a mandated access charge would necessarily be subject to some variant of a SAC analysis.

Conclusions

Having already discussed the methodologies applied by other countries to their freight rail industry and the regulatory regimes applied to some other network industries, we return to the questions of whether SAC remains a valid instrument to determine the reasonableness of railroad rates, and whether the procedure can be simplified. We reach the following conclusions:

- First, the existing stand-alone cost methodology does recognize economies of scope with respect to total costs via the contribution of bridge traffic to the fixed costs of the SARR.
- Second, conceptually there could be additional economies of scope effect in reducing the marginal/variable costs of the traffic in dispute. The STB's guidance on SAC submissions allows and even encourages shippers to consider such economies.
- Third, at least one observer has recommended that the SAC methodology allows shippers to consider economies of scope between the SARR and all the other lines in the carrier's network, even if in different regions. This is not a recipe for simplification of the SAC methodology. It is, indeed, quite the opposite. It also seems to be at odds with the Staggers Act provisions for line rationalization and abandonment. These provisions indicate that policy requires rail lines to stand on their own financially and thus introducing revenue contribution from other lines seems inconsistent with the legislative provisions.

The project team concluded that there are two basic ways to simplify the SAC.

- First, the definition of the "most efficient network" could be simplified. Considering the consolidation and line discontinuance that has occurred throughout the industry over the past four decades, the existing railroads have much more direct routes than they formerly had. As a result, this expensive and time consuming aspect of the stand-alone costing of determining the optimal route is perhaps no longer required (as already done in Simplified SAC).
- Second, STB could consider simplifying the contribution of the cross-over traffic, especially now that the U.S. rail network is operated by only seven Class I railroads. It is quite possible that they probably already have the maximum traffic that can be expected for a SARR.

These changes are only possible now, given the wave of rail mergers that were authorized since deregulation, which implicitly suggests that perhaps the U.S. no longer needs to debate potential efficient routings as in the past, when networks were fragmented.

At the same time, however, the Team believes that simplification of either the Three-Benchmark or Simplified-SAC tests risks moving the approaches further away from the bedrock CMP principles, undermine the reliability of the tests, and would not necessarily incentivize shippers to use those tests.

An alternative regulatory regime focused on offering competitive access may be an alternative to STB's Full-SAC approach. However, if such an approach was adopted:

- a) Shippers would lose access to maximum rate regulation; shippers would have no assurance that the rates offered by a competitor would be less than that offered by the incumbent.
- b) There would still need to be a regulatory role to set carrier-to-carrier access prices, and
- c) Unless the Congress is willing to abandon carrier revenue adequacy as a major legislated objective of U.S. freight rail policy, the rate reasonableness methodology for access charges will still require some form of SAC analysis for the most common disputes, such as those involving coal rates.

In sum, STB's Full-SAC has stood the test of time as a maximum rate reasonableness methodology and is justifiable *in some cases*. However, the less expensive Simplified-SAC and Three-Benchmark methods are also available as options for shippers, and there is reason to believe that shippers can achieve similar results to Full SAC under these less-costly alternatives.

1 Introduction

The Surface Transportation Board (STB or the Board) was established in January 1996 as a decisionally independent, bipartisan, adjudicatory body, with jurisdiction over certain surface transportation economic regulatory matters.²⁵ One of the STB's statutory duties is to adjudicate complaints brought by shippers against the rates charged for railroad transportation pursuant to its authority under 49 United States Code (U.S.C.) § 10701 et seq. For rail traffic that is subject to the STB's rate jurisdiction, the STB's governing statute requires that rates be "reasonable." The Board does not have jurisdiction over the reasonableness of a rate for rail transportation unless the rail carrier providing the service has "market dominance" in that particular market. Market dominance exists when there is "an absence of effective competition from other rail carriers or modes of transportation for the transportation to which a rate applies."²⁶ The statute explicitly recognizes that competitive alternatives can comprise both intra-modal competition (another railroad) and inter-modal competition (e.g., trucks, ships, barges, pipelines, etc.).

Since the mid-1970s, the freight railroad industry has become more concentrated. According to the U.S. Government Accountability Office (GAO), there were 63 Class I railroads operating in the United States in 1976, but the number had been reduced to 7 by 2006 as a result of mergers, bankruptcies, and a redefinition of what constitutes a major railroad.²⁷ These are: BNSF Railway Company (BNSF); CSX Transportation, Inc. (CSX); Grand Trunk Corporation (including U.S. affiliates of Canadian National Railway); Kansas City Southern Railway Company; Norfolk Southern Combined Railroad Subsidiaries (Norfolk Southern); Soo Line Corporation (including U.S. affiliates of Canadian Pacific Railway); and Union Pacific Railroad Company (Union Pacific). The railroad industry is dominated by four Class I railroads, two in the East (CSX and Norfolk Southern) and two in the West (BNSF and Union Pacific). Consolidation in the industry has helped improve its overall financial condition, but also raised concerns among some stakeholders about a loss of competition among railroads and service quality degradation.

In its 2006 report on competition in the U.S. freight railroad industry, the GAO gave an example of the difference in rates paid by shippers that were served by more than one railroad from those that were served by only one. The report documented differences in rates paid by grain shippers on two different routes ending in Portland, Oregon: "Both routes carry comparable tonnage, but the route originating in the economic area in and around Sioux Falls, South Dakota, is served by two Class I railroads, whereas the route from the Minot, North Dakota, economic area is served by one Class I railroad. The rates for the Minot route are roughly double the rates for the Sioux Falls route."²⁸ However, even if rates paid on the Minot route may be double those charged on the Sioux Falls route, that is not necessarily indicative of whether or not those rates were *unreasonable* because railroads are permitted to differentially price with

²⁵ Administratively, the STB was part of the Department of Transportation until passage of the Surface Transportation Board Reauthorization Act of 2015, Pub. L. No. 114-110, which, in Section 3, made the STB "an independent establishment of the United States Government."

²⁶ 49 U.S.C. § 10707(a).

²⁷ U.S. Government Accountability Office, "Freight Railroads: Industry Health has Improved, but Concerns about Competition and Capacity Should be Addressed," GAO-07-94 (Washington, DC, 2006), 19.

<http://www.gao.gov/products/GAO-07-94>

²⁸ *Ibid.*, 21.

the consequence that shippers without good alternatives will pay higher rates. It is the responsibility of the STB to make that determination.

The process through which STB determines the reasonableness of rates is complex, time-consuming, and expensive. The basic challenge to the Board is to estimate what a reasonable rate would be were a competitive market to exist, given the legislative framework within which it operates. As this report discusses in more detail in subsequent chapters, the standards that the STB uses to assess freight rail rates are intertwined with STB's legislative guidance and with the freight railroad industry and its evolving financial condition.

The Staggers Rail Act of 1980²⁹ (Staggers Act) built upon other important pieces of legislation passed during the 1970s to assist with the industry's recovery and to improve the efficacy of its regulation. The Staggers Act contained multiple goals and regulatory policies, including

to assist the rail system to remain viable in the private sector of the economy; and

to provide a regulatory process that balances the needs of carriers, shippers, and the public.

Section 101 of the Staggers Act specified the policies of the Federal government with respect to rail regulation.³⁰ These included allowing competition and the demand for services to establish reasonable rates for rail transportation, minimizing Federal regulatory control over rates, and promoting an efficient rail system by allowing carriers to earn adequate revenues.

In 1980, when the Staggers Rail Act was passed, there were 18 Class I railroad systems operating in the U.S.³¹ By 2000, that number had fallen to seven. Such consolidation has helped the industry rationalize its network and better match capacity to the market. At the same time, however, consolidation has raised challenges for shippers, which have may have fewer options for transporting products. Some shippers have complained that STB's rate-review process is inaccessible to them – that only the largest shippers can afford the investment to challenge rates. STB itself has likewise recognized the issue.

In 2011, the STB initiated a public hearing process to examine competition issues. Among the factors the Board cited as its reasons for opening the proceeding were, "the improving economic health of the railroad industry" and "increased consolidation in the Class I railroad sector."³²

In June 2013, the STB began re-examining whether many of the economic regulatory practices in place for many years remained appropriate for and relevant to the rail industry. The Board held a hearing to further examine issues related to the accessibility of rate complaint procedures for grain shippers and

²⁹ *Staggers Rail Act of 1980*, Pub. L. No. 96-448, 94 Stat. 1895-1966 (1980).

³⁰ These were codified at 49 U.S.C. §10101 – Rail Transportation Policy.

³¹ Class I railroads are regulated by the STB and subject to the Uniform System of Accounts (49 CFR 1201).

Railroads are classified based on their annual operating revenues. The Class to which a carrier belongs is determined by comparing its adjusted operating revenues for three consecutive years. Class I railroads are those with adjusted operating revenues of \$475 million or more as of 2014. There are currently seven Class I railroads (BNSF Railway Company, Canadian National Railway Company, Canadian Pacific Railway, CSX Transportation Inc., Kansas City Southern Railway Company, Norfolk Southern Corporation, and Union Pacific Railroad).

³² *Competition in the Railroad Industry*, Ex Parte No. 705, slip op. at 3 (STB served Jan. 11, 2011).

provide interested persons the opportunity to comment on the modifications to the existing procedures and the alternative rate relief methodologies proposed during the public comment period.³³

In 2014, the Board also instituted an ex parte proceeding (EP 722) to explore the Board's methodology for determining railroad revenue adequacy and the use of the revenue adequacy component of Constrained Market Pricing in rate reasonableness cases.

The U.S. Congress has also taken note of the improving financial condition of the industry and the challenges faced by some shippers. In 2013, the staff of the U.S. Senate Committee on Commerce, Science and Transportation issued a report that found that U.S. railroads were establishing record-low operating ratios, experiencing record growth in operating income, and posting record earnings-per-share figures.³⁴ Based on these findings and statements from senior railroad officials, the report then concluded that it was an appropriate time to reassess the regulatory approach applied to the industry. The Committee report noted that "railroads were struggling financially when the Staggers Act was enacted" and "the regulatory system that was built on that law places heavy focus on helping railroads earn higher revenues."³⁵ Because railroads had since begun to consistently generate significant profits and healthy returns, it was now appropriate for policy-makers to assess "whether the current regulatory system effectively balances the interests of railroads, shippers, and consumers."³⁶

The Congress has held oversight hearings of STB in 2014 and 2015 as part of its ongoing legislative responsibilities and as part of the work leading to the reauthorization of the STB.³⁷ In 2015, the Board's acting chairman testified to the House Committee on Transportation and Infrastructure concerning the STB's rate review process. She also said that while the SAC test is "based on sound economic principles," its execution "creates difficulty" and can be "herculean."³⁸ She noted that "No grain shipper has brought a rate complaint before the agency since 1981."³⁹

³³ *Rail Transportation of Grain, Rate Regulation Review*, Ex Parte No. 665 (Sub-no. 1), slip op. at 1 (STB served Dec. 12, 2013).

³⁴ Senate Committee on Commerce, Science, and Transportation, Office of Oversight and Investigations, "Update on the Financial State of the Class I Freight Rail Industry," Majority Staff Report, (2013), 2.

³⁵ *Ibid.*, i.

³⁶ *Ibid.*

³⁷ U.S. Congress, Senate Committee on Commerce, Science, and Transportation, *Freight Rail Service: Improving the Performance of America's Rail System*, hearings, 113th Cong., 2nd sess., September 10, 2014 (Washington, DC: GPO, 2014). U.S. Congress, Senate Committee on Commerce, Science, and Transportation, *Freight Rail Transportation: Enhancing Safety, Efficiency, and Commerce*, hearings, 114h Cong., 1st sess., January 28, 2015 (Washington, DC: GPO, 2015). U.S. Congress, House Committee on Transportation and Infrastructure, Subcommittee on Railroads, Pipelines, and Hazardous Materials, *The 35th Anniversary of the Staggers Rail Act: Railroad Deregulation Past, Present, and Future*, 114h Cong., 1st sess., May 13, 2014 (Washington, DC: GPO, 2015).

³⁸ Testimony of Deb Miller, Acting Chairman, STB, Before the Subcommittee on Railroads, Pipelines, and Hazardous Materials, Committee on Transportation and Infrastructure, U.S. House of Representatives, (May 13, 2015), 10.

³⁹ *Ibid.*, 8.

1.1 Objectives of this Report

As part of its effort to examine its approach to reviewing rail rate reasonableness, the STB initiated this study to examine the academic and scholarly literature that addresses proposed alternatives to all or part of the STB's current rate regulation methodologies. The general research questions that this report sought to answer were:

- What methodologies do other national regulatory agencies apply to examine the reasonableness of rates levied by railroads, utilities, natural monopolies, or other network industries, and are any of those approaches suitable for the STB's purposes, given its statutory responsibilities and limitations?
- Is SAC still a valid instrument to determine the reasonableness of rates?
- Can that procedure be simplified?

The research questions that this report sought to answer were:

- *What methodologies do other national regulatory agencies apply to examine the reasonableness of rates?*
 - *Is SAC still a valid instrument to determine the reasonableness of rates?*
 - *Can that procedure be simplified?*
-

1.2 Organization of the Report

This report is organized broadly into four major sections.

The first section provides an overview of the legislative history of federal oversight of the freight rail industry, which is inevitably tied to the industry's economic regulation. Chapter 2 provides a summary of the major pieces of legislation that shaped the government's regulatory oversight of the industry, from the creation of the Interstate Commerce Commission (ICC) to the present. It discusses the legislative response to the industry's financial decline, with the overall goal of revitalizing and stabilizing the railroads' financial health, and establishing a more flexible regulatory regime that placed primary reliance on competition. The chapter also briefly reviews some of the major economic and regulatory concepts of the government's approach to rate regulation, especially constrained market pricing principles and the stand-alone cost test. These were instituted following enactment of the major federal pieces of legislation. The chapter also introduces STB's efforts to simplify its regulatory approach to rate relief.

The second section covers the economics of freight rail regulation. Chapter 3 provides a summary of the important economic concepts that govern rail operations and pricing, including economies of scope, joint and common costs, and Ramsey Pricing. Economies of scope arise in the railroad industry because of the presence of joint and common costs. Joint and common costs in the railroad industry generally appear when the railroads use the same tracks and infrastructure to serve different shipments by various shippers of commodities. Ramsey pricing is a principle under which firms set their prices above the marginal cost to cover their fixed and common costs. The chapter reviews some of the leading economic literature that connects the concepts of constrained market pricing and the stand alone cost with economies of scope and Ramsey pricing principles. Chapter 4 then explains in greater detail the tests

used by the STB to determine the reasonableness of rates charged by railroads: the “Full Stand-Alone Cost” procedure and the two subsequent simplifications of that procedure, the Three-Benchmark procedure and the Simplified Stand-Alone Cost procedure. This chapter also examines the main challenges that have emerged since their introduction.

In the third major section, the report examines the broad questions of whether the Board’s Stand-Alone Cost procedure can be simplified. Chapter 5 reports the results of the project team’s application of STB’s simplified standards to two cases that were decided using the Full-SAC procedure. The fundamental question examined was whether the use of the Three-Benchmark or Simplified-SAC procedure produced the same basic results as the Full-SAC. Chapter 6 then summarizes the experience of other countries that employ fundamentally different regulatory regimes – Canada’s system of final offer arbitration to negotiated commercial rates and access regimes used in the United Kingdom (UK) and Australia. In Chapter 7, the project team examines whether some form of access regulation might be applied in the United States, were it considered within the STB’s legislative authority.

The fourth and final section offers conclusions and recommendations. Chapter 8 summarizes the project team’s analysis of its examination of the use of the STB’s simplified standards and access regimes. The chapter offers insights into whether the Simplified Standards could be applied more widely and if so, what the implications might mean not only for shippers and carriers, but for the STB as well.

1.3 Methodology

This project was divided into four distinct phases, culminating in the production of this final report.

Literature Review. First, the study team completed a thorough review of the literature relevant to SAC and potential alternative approaches to rate regulation methodologies. This forms the intellectual foundation of the project. The project team systematically reviewed economics, business, law, and other relevant literature (e.g., academic manuscripts and books) concerning rail rate regulation in particular and network industries in general. The literature covered both STB’s regulatory processes (in theory and application), as well as other models applied by other national governments both to their rail industry and other network industries. Much of this research is reflected in the report that follows concerning the economic foundations of the STB’s regulatory approach. The brief summary of the regulatory approaches applied by Australia and the UK to their freight rail sector, and the regulatory approaches applied to the telecommunications industry are included in this report. The details of the literature review are under separate cover as the Task 1 report.

Analysis of Alternative Approaches. Following discussions with STB staff, the study team then analyzed those materials and evaluated the claims, findings, and conclusions regarding whether those approaches might be appropriate for the STB’s possible adoption and implementation. Major considerations were whether the proposed methodologies would likely reduce the time, complexity, and expense that has historically been involved in the litigation and resolution of rate reasonableness complaints. The study team also assessed whether the alternatives might affect the STB’s ability to achieve outcomes that are fair and reasonable to both railroads and shippers.

Discussion. The project team then held discussions with the STB staff on the tentative conclusions of this analysis.

Report. Finally, the project team assembled all of the materials, analyses, conclusions, and recommendations into this final report. The report was provided to the STB for its review and comments. STB offered a number of comments to clarify the draft, which the project team considered and incorporated as appropriate.

1.4 Acknowledgements

The conclusions in this report reflect the independent analysis of InterVISTAS Consulting Inc. However, the project team included assistance from several other individuals and firms, without whose assistance the report would not have been possible. These were J. Chris Rooney of the Vanness Company, John H. Broadley & Associates, P.C., and K.R. Saline and Associates, PLC.

2 Legislative and Regulatory Context

Federal oversight of freight rail rates has existed since 1887, when the Congress enacted the Interstate Commerce Act (ICAct) to protect shippers from the monopoly power of the rail industry.⁴⁰ That act created the Interstate Commerce Commission (ICC) to provide regulatory oversight. The ICC's statutory mandate was later expanded to include interstate trucking, bus operations, pipelines, domestic water carriers, and freight forwarders. Federal economic regulation of transportation encompassed supervision of market entry and exit, rates, terms and conditions of service, consolidations, and service quality.⁴¹

For decades, railroads have been the primary mode of transportation for many products, especially for such bulk commodities as coal, grain, chemicals, fertilizers and forest products, among others. Yet, by the 1970s American freight railroads were in a serious financial decline. The Congress responded by passing three pieces of major legislation with the overall goal of revitalizing and stabilizing the railroads' financial health, and establishing a more flexible regulatory regime that placed primary reliance on competition. This chapter reviews the primary changes in the legislative and regulatory context for freight rail.

2.1 Regional Rail Reorganization Act of 1973

The Regional Rail Reorganization Act of 1973 (the "3R Act") was enacted by Congress in an effort to consolidate and revitalize insolvent railroads in the Northeastern United States following the financial collapse of the nation's largest transportation company, the Penn Central – which was one of the largest bankruptcies in U.S. history.⁴²

Although the factors that caused the decline in the financial viability of American railroads beginning after World War II were national in scope, their effects were most pronounced in the Northeast. Between 1967 and 1973, eight northeastern railroads, in addition to the Penn Central, filed for bankruptcy reorganization under section 77 of the Bankruptcy Act.⁴³

First, and of the utmost importance, many of the industries which relied upon railroad declined in importance, while the geographic location and service requirements of major industrial users shifted. Heavy industry had begun migrating from the Northeast to the South and West, while the industry that

⁴⁰ Some states began forms of regulation of railroads as early as the 1840s.

⁴¹ Dempsey, Paul Stephen, *The Rise and Fall of the Interstate Commerce Commission: The Tortuous Path From Regulation to Deregulation of America's Infrastructure*, 95 Marq. L. Rev. 1150, 1160-1161 (2012).

⁴² Drury, George H., *The Historical Guide to North American Railroads: Histories, Figures and Features of more than 160 Railroads Abandoned or Merged since 1930*, (Waukesha, Wisconsin: Kalmbach Publishing, 1994), 215, 248–251.

⁴³ Bleich, Alisa Levin, *Note, Regional Rail Reorganization Act of 1973: Was Congress on the Right Track?*, 49 St. John's L. Rev. 98 (1974) <http://scholarship.law.stjohns.edu/lawreview/vol49/iss1/5/>

remained in the Northeast was shifting away from train-delivered coal at individual industrial plants to delivery to utilities where power was generated and sold to users.⁴⁴

Second, following World War II, railroads saw a dramatic decline in their passenger business, which, by 1967, had become deeply unprofitable, again particularly in the Northeast. In 1970, the Rail Passenger Service Act allowed the railroads to contribute their passenger services and equipment to the National Railroad Passenger Corporation (Amtrak) for stock to unburden themselves of passenger losses.⁴⁵

Third, railroads faced increasing competition from the trucking, barge, and air cargo sectors. This competition was also facilitated by federal investment in (i.e., subsidization of) interstate highways, waterways, and airports. Trucking was a particularly relevant alternative in the Northeast where distances between major cities are relatively short and many highways were then relatively new and uncongested. At the time, the Northeast rail system was also primarily designed for short-haul service. While it would have been economically advantageous to focus on long-haul service, the railroads then lacked sufficient capital available for a major restructuring.⁴⁶ The result of competition between modes was that the railroad share of intercity freight dropped from around 75 percent at the end of the 1920s to 40 percent by 1970.⁴⁷

Fourth, government regulatory policies further contributed to the weakening of the railroads. In particular, the rail rate structure was relatively inflexible under the then-existing regulatory procedures. Notably, the ICC set minimum rates for the majority of railroad charges, but regulated a relatively smaller portion of the charges of the trucking and barge industries. This further hindered the railroads' ability to respond to increased competition.⁴⁸

Fifth, existing legislation was ill-equipped to deal with the Northeast rail problem. It was widely believed that major consolidation and abandonment of excess trackage was necessary to revitalize the railroads in the Northeast.⁴⁹ However, under section 77 of the Bankruptcy Act, each debtor was required to seek approval of its own plan of reorganization. With seven Class I railroads and two Class II railroads petitioning for reorganization in several different jurisdictions, it would have been virtually impossible for any single plan to accomplish the needed consolidation and rationalization of rail service. Section 77 proceedings were also highly time-consuming. Although ultimate responsibility rested with the District Court, the ICC had to authorize any reorganization prior to judicial confirmation. As a result, proceedings could continue for several years during which the assets of the railroads suffered continued and substantial deterioration.⁵⁰

⁴⁴ Guetschow, Gregg, *The Creation of Conrail and Its Impact on Railroad Regulation*, 8 Policy Perspectives 14-15 (2009).

⁴⁵ *Rail Passenger Service Act of 1970*, Pub. L. No. 91-518, 84 Stat. 1327-42 (1970), 49 U.S.C. § 24101 et seq.

⁴⁶ Bleich, *Regional Rail Reorganization*, 49 St. John's L. Rev. at 100.

⁴⁷ Braeutigam, Ronald R, *Consequences of Regulatory Reform in the American Railroad Industry*, 59 So. Econ. J. 470 (1993).

⁴⁸ See, for example, Winston, Clifford, "The Success of the Staggers Rail Act of 1980," *AEI-Brookings Joint Center for Regulatory Studies* Publication 05-24, (2005): 2-3.

http://www.brookings.edu/~media/research/files/papers/2005/10/railact-winston/10_railact_winston.pdf

⁴⁹ Bleich, *Regional Rail Reorganization*, 49 St. John's L. Rev. at 103.

⁵⁰ *Ibid.*, 104.

To resolve the Northeast rail crisis, the 3R Act established two organizations: (1) the United States Railway Association (USRA), a government-owned corporation which formulated a final system plan for addressing the problem of rail service in the Northeast, and (2) Consolidated Rail Corporation (Conrail), a for-profit enterprise which acquired the lines designated under the final system plan and operated the rail system formulated by the USRA. In 1973, the bankrupt Penn Central and five smaller railroads were merged into Conrail.⁵¹

The final recommendation by the USRA involved abandoning designated portions of the Northeast system, while Conrail would operate the remainder until it returned to profitability. Although shippers and communities directly impacted by the abandonments expressed opposition to the plan, the 3R Act provided that the final recommendation from the USRA would “have the force of law if it was not disapproved by either house of Congress within sixty legislative days after its release.”⁵² There was no Congressional disapproval, and the plan went into effect on November 9, 1975.

2.2 Railroad Revitalization and Regulatory Reform Act of 1976

Three years after the 3R Act, Congress enacted the Railroad Revitalization and Regulatory Reform Act of 1976 (the “4R Act”) to address nationwide problems in the rail industry. The 4R Act implemented the first substantial reduction in federal regulation of railroads since passage of the ICAct.

The 4R Act modified railroad regulation by the ICC in a range of areas, including rates, line abandonment, and mergers. First, it provided new rate-setting flexibility by permitting a railroad to adjust its rates up or down within a “zone of reasonableness” without regulatory approval. The “zone of reasonableness” was initially within seven percent of the existing ICC tariff and was to be widened over time.⁵³ Rail rates that might exceed cost-based just and reasonable maximum rate levels would be allowed so long as they applied to traffic where the railroad did not have “market dominance” (which was defined as “an absence of effective competition from other carriers or modes of transportation, for the traffic or movement to which a rate applies.”)⁵⁴

Second, the 4R Act set timelines for the ICC to process abandonment applications to limit the time (and cost) to the railroads of abandoning unprofitable lines.⁵⁵ The Act also made provision for unprofitable lines to be subsidized where a “financially responsible person” would provide financial assistance which would allow the line to cover avoidable costs, including “a reasonable return on the values of such line”.⁵⁶

⁵¹ Guetschow, “The Creation of Conrail,” 18.

⁵² Perritt Jr., Henry H., *Ask and Ye Shall Receive: The Legislative Response to the Northeast Rail Crisis*, 28 Vill. L. Rev. (1983), 311.

⁵³ Braeutigam, *Consequences of Regulatory Reform*, 59 So. Econ. J. at 471.

⁵⁴ *Railroad Revitalization and Regulatory Reform Act of 1976*, Pub. L. No. 94-210, 90 Stat. 1(1976), Section 202(c)(1).

⁵⁵ Keeler, Theodore E., *Railroads, Freight, and Public Policy*, (Washington D.C.: The Brookings Institution, (1983), 34.

⁵⁶ *Railroad Revitalization and Regulatory Reform Act of 1976*, Section 802 (amending former section 1 of the ICAct by adding new paragraph a(6), 49 U.S.C. § 1a(6)). The ICAct was recodified in 1978 with the substantive provisions beginning at 49 U.S.C. § 10101.

Third, the 4R Act introduced statutory changes to merger regulation to encourage consolidation and joint use of facilities. Specifically, the Act aimed to expedite the processing of merger petitions. To accomplish this objective, legislation established time constraints for each stage of the processing. The ICC was required to render its decision on proposed mergers within 31 months of submission.⁵⁷

2.3 The Staggers Rail Act of 1980

The Staggers Rail Act of 1980 (Staggers Act) built on the foundation of the 4R Act to further revitalize the railroad industry in the U.S. following a long period of decline in performance.

Goals of the Staggers Act

Anticipating a capital shortfall of between \$16 and \$20 billion, the Congress concluded there was an urgent need to end the ineffective regulation that was impeding the industry from becoming profitable.⁵⁸ Congress believed that deregulation was the necessary solution to return to profitability and to boost innovation. The Staggers Act of 1980 was intended to provide a framework for the deregulation in the railroad industry.

The Staggers Act pursued multiple goals:

- (1) to assist the railroads of the Nation in rehabilitating the rail system in order to meet the demands of interstate commerce and the national defense;*
- (2) to reform Federal regulatory policy so as to preserve a safe adequate, economical, efficient, and financially stable rail system;*
- (3) to assist the rail system to remain viable in the private sector of the economy;*
- (4) to provide a regulatory process that balances the needs of carriers, shippers, and the public; and*
- (5) to assist in the rehabilitation of financing of the rail system.⁵⁹*

The main purpose of the Staggers Rail Act of 1980 was thus to restore the economic efficiency of the industry by allowing railroads to compete with each other and other modes of transportation on the basis of price and service quality and by establishing railroad revenue adequacy as a regulatory priority which would ensure a financially stable rail system.

Importantly, in a new section captioned Rail Transportation Policy,⁶⁰ the Staggers Act clearly stated federal policy with respect to railroads and rail regulation. These included:

- (1) to allow, to the maximum extent possible, competition and the demand for services to establish reasonable rates for transportation by rail;*

⁵⁷ Crum, Michael R. and Allen, Benjamin J., "U.S. Transportation Merger Policy: Evolution, Current Status, and Antitrust Considerations" (1986). Supply Chain and Information Systems Publications. Paper 9.

⁵⁸ Staggers Rail Act of 1980, § 2(7).

⁵⁹ Staggers Rail Act of 1980, § 3 (1) – (5).

⁶⁰ Staggers Rail Act of 1980, § 101(a), codified as 49 U.S.C. § 10101a (Suppl. IV 1980).

(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 Interstate Commerce Commission;

(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;

(6) to maintain reasonable rates where there is an absence of effective competition and where rail rates provide revenues which exceed the amount necessary to maintain the rail system and to attract capital;

...

(12) to prohibit predatory pricing and practices, to avoid undue concentrations of market power, and to prohibit unlawful discrimination;

...and

(15) to provide for the expeditious handling and resolution of all proceedings required or permitted to be brought under this part.

The Staggers Act clearly stated federal policies regarding rail regulation. Among others, these included:

allowing competition and the demand for services to establish reasonable rates, requiring fair and expeditious regulatory decisions when required,

allowing rail carriers to earn adequate revenues, and

protecting shippers by requiring rates to be reasonable where there is an absence of effective competition.

Staggers Act - Major Measures

Among the major changes introduced by the Staggers Act, the most important was the removal of inefficient commodity rate regulation. The Staggers Act phased out industry-wide rate increases and permitted railroads to freely set rates and to enter into confidential contracts with shippers. By removing rate regulation except for situations where the carrier was market dominant and the shipper could demonstrate that the rate was unreasonable, the Congress effectively allowed the railroads to become responsible for their own performance.

The Staggers Act authorized the railroads to use differential pricing. Rates would be established based on market demand, which would reflect, in part, shippers' ability to pay. Congress understood that if railroads charged the same price per ton-mile to all shippers, this average price would give some shippers an incentive to choose another less expensive transportation mode. With fewer shippers remaining, they would have to pay higher rates in order to cover the fixed and common costs of the railroad. This higher rate could force additional shippers out of the market, leaving even fewer shippers to cover fixed and common costs. Differential pricing would allow railroads to design pricing strategies, based on market forces which would enable them to cover their total costs. This was particularly important for commodities

and manufactured products facing strong competition from the trucking industry and enabled railroads to retain more traffic. Those shippers with the fewest alternatives were expected to bear a higher share of the costs to ensure revenue adequacy.⁶¹ Differential pricing effectively provided new tools for railroads to maximize the use of rail transport, and the resulting higher traffic volumes allowed lower rates for shippers overall than if fixed pricing (i.e., average cost pricing) had been used.

The Act also enhanced the ability of railroads to rationalize their systems by abandoning unprofitable lines and merging with each other. The Staggers Act introduced a new process intended to ease the abandonment of lines to speed up operational improvement and financial recovery. The Act reduced some regulatory barriers to ease railroad mergers by establishing a shorter decision process and streamlining rules. This measure allowed railroads to reduce their costs and increase their productivity by focusing on higher density and longer haul traffic. It also permitted the railroads to rationalize their networks by eliminating small, inefficient and costly segments.⁶²

Finally, the Act provided shippers with a regulatory mechanism to protect them from situations where market dominance existed. The Act also gave the ICC broad authority to issue exemptions from regulation where regulation was not necessary to carry out federal rail transportation policy and the transportation or service was of limited scope or regulation was not necessary to protect shippers from the abuse of market power.⁶³

Residual Regulation

As a result of the direction by Congress, residual regulation was retained as necessary to prevent potential abuse of market dominance where there was an absence of effective competition.

“Captive shippers” are those that do not have an effective competitive alternative to the single railroad that serves their traffic. However, there is no widely agreed upon definition of what constitutes an “effective competitive alternative.” At a minimum, competitive alternatives comprise intra-modal competition (another railroad) or inter-modal competition (e.g., trucks, ships, barges, pipelines). Others cite other competitive constraints on railroad pricing that stems from gateway competition, source of supply competition, product competition, competition in the final goods market and shipper countervailing powers. Determining what constitutes effective competition can be difficult and estimates can range widely. According to Fritelli,⁶⁴ citing testimony of former STB chairman Roger Nober, captive shippers are a minority among all shippers and account for 15 to 20 percent of all rail movements. Clifford Winston and Curtis Grimm defined a captive shipper in their analysis of the U.S. railroad industry as a shipper that “*is served by only one railroad, with the only alternative railroad more than 50 miles away, is unable to use water transportation and does not use truck, and has no alternative locations that competing railroads*

⁶¹ Casavant, Ken et al., *Rail Rate and Revenue Changes Since the Staggers Act*, 50 J. of the Transp. Research Forum no. 1 (2011), <http://ses.wsu.edu/wp-content/uploads/2015/03/RailRate.pdf>

⁶² Not all trackage the larger railroads could not operate profitably were necessarily abandoned. The Staggers Act also facilitated the development of short-line railroads. This enabled track that was not profitable for major carriers to be sold and continue in productive use by small, flexible and low-cost short lines. According to the Association of American Railroads, about 45,000 miles of track are now operated by short lines.

⁶³ *Staggers Rail Act of 1980*, § 10505. The exemption power currently is codified at 49 U.S.C. § 10502.

⁶⁴ U.S. Library of Congress, Congressional Research Service, “Railroad Access and Competition Issues,” by John Fritelli, RL34117, (2007): 1, <http://www.publicpower.org/files/PDFs/CRSReporttoRailCompetitio80307.pdf>

*could use to serve the receiver.*⁶⁵ They estimated that captive shippers represented roughly 20 percent of the traffic and were mainly coal, non-metallic mineral or chemical shippers in the mountain or southern states with length of haul less than 1,000 miles.⁶⁶

If a captive shipper and the railroad fail in their commercial negotiations, the shipper can challenge the rate offered by the carrier by filing a complaint with the agency on the ground that the rate is unreasonable. Under this regulatory mechanism, the shippers and the railroads bear the cost of the regulation, meaning they are expected to provide evidence to support their respective cases. The burden on the shipper is substantial because, as the complainant, it bears the burden of proving that the rate is unreasonable.

The Staggers Act established a market-dominance threshold criterion: for market dominance to exist, the revenue-variable cost ratio (R/VC ratio) of the disputed service must exceed 180 percent.⁶⁷ If the R/VC ratio was less than 180 percent, then the carrier was deemed to not have market dominance over the particular service and the proposed rate was not considered unreasonable. But a ratio that exceeded the 180 percent threshold in and of itself was not sufficient to establish market dominance. Rather, the shipper was also required to prove that the railroad had market dominance by demonstrating the absence of effective rail and inter-modal competition (road, pipelines, and water transportation).

Once market dominance was established, the ICC still had to determine whether the shipper had demonstrated that the challenged rate was unreasonably high and, if so, what rate to apply to the service at issue. Complicating that determination was the requirement specifically included in the Staggers Act that the reasonableness of the rate should be determined with the underlying constraint of ensuring revenue adequacy to the railroads.

The standards and procedures to determine the reasonable rate were not detailed in the Staggers Act but left to the responsibility of the ICC. The ICC published a set of economic principles aiming to determine rates that ensure economic efficiency and revenue adequacy for the railroads. These were the “Constrained Market Pricing” (CMP) principles that were published in the ICC’s *Coal Rate Guidelines* in 1985.⁶⁸

2.4 Constrained Market Pricing Principles

The main purpose of these principles, which the STB continues to apply, is to protect captive shippers by constraining the potential market power of an incumbent railroad with respect to specific movements where the carrier is market dominant without imposing an inefficient regulatory mechanism on railroads generally. The objective behind the CMP principles is that: “*A captive shipper should not be required to pay more than is necessary for the carrier involved to earn adequate revenues. Nor should it pay more*

⁶⁵ Grimm, Curtis and Clifford Winston, “Competition in the Deregulated Railroad Industry: Sources, Effects and Policy Issues,” in *Deregulation of Network Industries: What’s Next?*, ed. Sam Peltzman and Clifford Winston, 41-71, (Washington, D.C.: AEI-Brookings Joint Center for Regulatory Studies, 2000), 62.

⁶⁶ *Ibid.*, 63.

⁶⁷ The R/VC ratio was initially 160% but progressively increased to 180% in 1984.

⁶⁸ *Coal Rate Guidelines*, 1 I.C.C. 2d, 520 (1985), *aff’d sub nom. Consol. R. Corp. v. ICC*, 812 F. 2d 1444 (3d Cir. 1987).

*than is necessary for efficient service. And a captive shipper should not bear the cost of any facilities or services from which it derives no benefit.*⁶⁹

The CMP principles are designed to prevent “captive” shippers from paying more than is necessary for the carrier involved to earn adequate revenues, from paying for inefficient service, and from bearing the cost of facilities or services from which it derives no benefit. The CMP principles recognized the importance of “Ramsey pricing” in the context of economies of scale and high fixed and common costs by allowing railroads to price above marginal cost. (Ramsey pricing is discussed in more detail in Chapter 3 below.) The CMP principles represent an operational solution to implement differential pricing based on Ramsey pricing principles. To implement these rules, the CMP principles are composed of three main components acting as constraints on the ability of market-dominant carriers to exercise their pricing power.⁷⁰

The CMP principles represent an operational solution to implement differential pricing based on Ramsey pricing principles.

The first is the **revenue adequacy constraint**. This constraint states that “...captive shippers should not be required to continue to pay differentially higher rates than other shippers when some or all of that differential is no longer necessary to ensure a financially sound carrier capable of meeting its current and future service needs.”⁷¹ The revenue adequacy constraint reflects the requirement that, in determining whether a rate is reasonable, the ICC (later the STB), must recognize the Congressional policy that the rate must be high enough to allow the railroad to earn revenue sufficient to cover costs, make normal profit and attract capital. Indeed, the Interstate Commerce Act, as amended by the ICC Termination Act (ICCTA, see below), continues to require that railroad revenues should:

(A) provide a flow of net income plus depreciation adequate to support prudent capital outlays, assure the repayment of a reasonable level of debt, permit the raising of needed equity capital, and cover the effects of inflation; and

*(B) attract and retain capital in amounts adequate to provide a sound transportation system in the United States.*⁷²

In other words, the revenue adequacy constraint is intended to ensure that railroads earn enough revenue to make normal profits -- but not more.

⁶⁹ *Major Issues*, slip op. at 6-7, citing *Coal Rate Guidelines*, 1 I.C.C. 2d at 523-24.

⁷⁰ *Coal Rate Guidelines*, 1 I.C.C.2d at 534. There is also a fourth “phasing constraint,” which is to mitigate the impact of the imposition of large rate increases, even when justified. The concern is that such large changes “could cause significant economic dislocations which must be mitigated for the greater public good.” *Ibid.*, 546-47.

⁷¹ *Ibid.*, 535-36.

⁷² 49 U.S.C. § 10704(a)(2).

The second constraint is the **management efficiency constraint**, which prevents the shippers from paying avoidable costs that result from the inefficiency of the railroad. Inefficiencies could be the consequence of multiple factors such as operating inefficiencies (management errors), plant inefficiency (nonproductive assets), and pricing inefficiencies.⁷³

The third component is the **stand-alone cost (SAC) constraint**, which is designed to protect captive shippers from the undue exercise of market power, from bearing the cost of inefficiencies arising from a poorly designed railroad, or from cross subsidizing other services.⁷⁴ In general, this constraint is intended to ensure that the revenue that a railroad earns from a service or a group of services does not exceed the total cost that a hypothetical efficient new railroad would incur in providing the same service or group of services. In short, the SAC constraint simulates the competitive rate that would exist in a contestable market by assuming competitive entry by a new highly efficient competitor railroad.

CMP principles are composed of three main components acting as constraints on carriers:

Revenue adequacy constraint

Management efficiency constraint

Stand-alone cost constraint

The Stand-Alone Cost test has been the predominant method used by shippers in rate reasonableness complaints. A few cases have been brought based on the Revenue Adequacy Constraint.⁷⁵ No cases have relied on the Management Efficiency constraint.

2.5 The Stand-Alone Cost Test

To prove that a challenged rate is unreasonable under the STB's SAC test, the shipper must demonstrate that the rate that a new competitor—the Stand-Alone Railroad (SARR)—would charge to serve the complaining shipper's traffic while fully covering its costs, including a reasonable return on investment, is lower than the challenged rate. To build this evidence, the shipper must design the hypothetical SARR, develop a credible operating plan and compute the SARR's costs, which generally require the use of complex computer models. The SAC test is based on a comparison between the rate obtained by simulating the financial requirements of this hypothetical efficient stand-alone railroad and the rate proposed by the railroad for this traffic in order to judge its reasonableness.

To serve the traffic at issue, the design of the hypothetical SARR and the operating plan need to take into account all geographical and technical constraints. Road property investments are estimated to ensure

⁷³ *Coal Rate Guidelines*, 1 I.C.C.2d at 537-42.

⁷⁴ *Ibid.*, 542-48. In *Major Issues*, slip op. at 7, the STB states that contestable markets "have competitive characteristics which preclude monopoly pricing."

⁷⁵ The few revenue adequacy-based complaints have either settled or involved other transportation modes. See *S. Miss. Elec. Power Ass'n v. Norfolk S. Ry.*, NOR 42128 (STB served Aug. 31, 2011) (proceeding in which revenue adequacy constraint raised in complaint was subsequently settled); *CF Indus., Inc. v. Koch Pipeline Co.*, 4 STB 637 (2000) (finding rate increases for pipeline transportation unreasonable under 49 U.S.C. § 15501 using revenue adequacy constraint), *aff'd sub nom. CF Indus., Inc. v. STB*, 255 F. 3d 816 (D.C. Cir. 2001).

that the efficient SARR will be financially viable in the long term. Operational costs such as labor, material, resources, and administrative costs are also computed. Present values of the future financial flows are estimated using a Discounted Cash Flow model based on a 20-year period (reduced later to 10 years).

2.6 ICC Termination Act of 1995

By 1995, the substantial deregulation of the rail industry was largely complete. In a further effort to limit federal economic regulation of surface transportation, Congress passed the ICC Termination Act of 1995 (ICCTA), which abolished the ICC, but transferred most of the ICC's railroad regulatory responsibilities to the newly created Surface Transportation Board (STB). The ICCTA made some notable changes to railroad regulation. For instance, the new law eliminated the requirement for railroad tariff and contract filings. It did not, however, remove railroads' common carrier obligations or alter the railroads' ability to carry out demand-based differential pricing or to negotiate service contracts containing confidential terms and conditions.⁷⁶

The ICCTA did not alter the railroads' ability to carry out demand based differential pricing.

2.7 The STB's Rate Case Simplification Efforts

The CMP principles are embedded in a complex methodology. By 1995, it had become widely recognized and accepted that the process for seeking regulatory relief from rates perceived to be unreasonable was exceptionally difficult and expensive, and prevented smaller shippers from seeking relief. Therefore, in ICCTA, the Congress directed the Board to develop a simplified rate review process for smaller complaints where the amount at issue was too low for the shipper to seek rate relief in light of the cost of a SAC case.⁷⁷

The STB subsequently developed and adopted its first set of simplified procedures (generally known as Simplified Guidelines) in Rate Guidelines -- Non-Coal Proceedings in 1996.⁷⁸

Rate Guidelines – Non-Coal Proceedings (1996) – Simplified Guidelines

The Simplified Guidelines were intended to decrease the cost of the litigation while still relying on the CMP principles. The challenge for STB was to balance the need for sound economic criteria with the necessity to simplify the calculation process to reduce the cost of the procedure. The approach adopted was known as the Three-Benchmark procedure. The proposed procedure was based on a comparison

⁷⁶ U.S. General Accounting Office, "Railroad Regulation: Changes in Railroad Rates and Service Quality since 1990," GAO/RCED-99-93 (Washington, DC, 1999), 22-24, <http://www.gao.gov/products/GAO/RCED-99-93>.

⁷⁷ Technically, the Congress directed the STB to complete a rulemaking that the ICC had started to establish a simplified method for deciding rate reasonableness in cases where a full stand-alone cost presentation would be too costly given the value of the case. 49 U.S.C. § 10701(d)(3).

⁷⁸ STB Docket No. Ex Parte 347 (Sub No. 2), 1 STB 1004 (STB served Dec. 31, 1996) ("Rate Guidelines - Non-Coal") ("Simplified Guidelines").

between the revenue/variable cost ratio (R/VC) of the traffic at issue and a combination of three benchmark ratios.

- The first benchmark is the Revenue Shortfall Allocation Method (RSAM). The RSAM measures “the uniform markup above variable cost that would be needed from every shipper of potentially captive traffic (the >180 traffic group) in order for the carrier to recover all of its URCS fixed costs.”⁷⁹
- The second benchmark is the revenue to variable cost ratio for comparable traffic, (R/VC_{COMP}), based on movements sharing the same characteristics with the traffic at issue. This measure is intended to “provide a means of reflecting demand-based differential pricing principles.”⁸⁰ While the STB noted this test is “admittedly crude” it concluded that this “was the only simple means available to obtain even a rough measure of this very important pricing factor.”⁸¹ Some might call this the “markup (or mark down) rates paid by comparable traffic” method.
- Finally, the third benchmark is the revenue to variable costs over 180 percent ratio (R/VC_{>180}). It measures the average markup over variable cost earned on potentially captive shippers by the defendant railroad. This benchmark “measures the degree of differential pricing actually being practiced by that carrier.”⁸² STB computes the RSAM and the R/VC_{>180} every year. Some might call this the “What is the actual current average markup being paid by all potentially captive shippers” method.

Simplified Standards (2007)

A decade after their publication, only three shippers had initiated a proceeding using the Simplified Guidelines. All three settled before an STB decision on the merits.⁸³

The Congress was cognizant of the challenges that shippers faced in challenging rail rates. In response to congressional concern about the potential barriers that shippers face in seeking relief from allegedly unreasonable rail rates, the GAO examined issues related to the Board’s oversight of rates shippers pay. In 1999, the GAO reported that very few shippers served by class I railroads had complained to the Board about the railroads’ rates. Shipper associations noted that the complexity of the rate complaint process may have reduced the number of complaints. GAO surveyed a large number of shippers about the rate review process. Of those who expressed an opinion about the rate complaint process, over 70 percent

⁷⁹ *Simplified Guidelines*, slip op. at 19, 1 S.T.B. at 1027.

⁸⁰ *Ibid.*, slip op. at 25, 1 S.T.B. at 1034.

⁸¹ *Ibid.*

⁸² *Ibid.*, slip op. at 28, 1 S.T.B. at 1038.

⁸³ In addition, there have been four cases where the railroad did not wish to undergo a full SAC proceeding, and agreed to a “Stipulated R/VC” process. In these cases, the parties agreed to use the R/VC ratio at the 180% level in lieu of SAC.

believe that the time, complexity, and costs of filing complaints are barriers that often preclude them from seeking rate relief.⁸⁴

In reaction to the unexpectedly low level of usage, the Board held public hearings to learn about the concerns of stakeholders and to understand why shippers so seldom used the simplified procedure. Concluding that “the shipper community perceives [the Simplified Guidelines] as too vague, and as requiring prolonged litigation over whether a shipper even qualifies to use them,”⁸⁵ the Board adopted new Simplified Standards in September 2007,⁸⁶ which revised the existing Three-Benchmark procedure and created a new simplified procedure called the Simplified Stand-Alone Cost (Simplified-SAC). This new approach was intended to provide simpler and faster procedures for shippers seeking what was considered a “medium” level of relief (originally proposed to be between \$1 million (for the Three-Benchmark Method) and \$5 million (for Simplified SAC) or less over five years). The Board concluded that rate relief under the simplified approaches needed to be capped because they were less precise and robust than a full SAC case. Simplified Standards gave complaining shippers the option of proceeding under the Three-Benchmark method, Simplified-SAC, or full SAC, but the decision had to be made at the outset when filing the complaint.

The Simplified-SAC procedure was designed to mimic the previously-adopted “Full-SAC” process while being less onerous.

The Simplified-SAC procedure was designed to mimic the previously-adopted “Full-SAC” process while being less onerous. The main difference was that under the simplified approach, shippers were not required to “build” an entire hypothetical railroad. They were expected to use the existing infrastructure that serves the traffic at issue to estimate the cost of an efficient railroad. After the wave of mergers and the track abandonments 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.

In its *Simplified Standards* decision, the Board also introduced major changes to the Three-Benchmark test, including changes in the comparable group determination, the RSAM and R/VC_{>180} calculations, and the rate relief cap. These changes are discussed in greater detail in Section 4.

Since 2007, shippers have filed two Simplified-SAC cases (in both cases the parties reached a settlement) and five Three-Benchmark cases, only one of which was actually determined by the STB.⁸⁷ The four remaining Three-Benchmark cases were settled by the parties prior to a Board decision on the

⁸⁴ U.S. General Accounting Office, *Railroad Regulation: Current Issues Associated with the Rate Relief Process*, GAO/RCED-99-46 (Washington, DC, 1999), <http://www.gao.gov/products/GAO/RCED-99-46>. The General Accounting Office was renamed the Government Accountability Office in 2004.

⁸⁵ *Simplified Standards for Rail Rate Cases*, Docket No. Ex Parte 646 (Sub No. 1), slip op. at 4 (STB served Sept. 5, 2007) (“*Simplified Standards*”).

⁸⁶ *Ibid.*

⁸⁷ STB, Docket No. 42114: *U.S. Magnesium v. Union Pacific*. The decision, issued on January 28, 2010, found the rates to be unreasonable.

merits.⁸⁸ The procedure has been criticized for the approximation it made to the CMP principles and its presumed lack of adherence to these principles.⁸⁹ However, in view of the response to Simplified Standards from shippers who were supposed to benefit from rate case simplification, shippers had success in convincing the STB that the relief caps were too low to make the Simplified Standards a viable alternative to Full SAC.

Removal of the Rate Relief Limit for Simplified SAC in 2013

In *Rate Regulation Reforms*, Ex Parte 715, (served July 18, 2013), the STB removed the limit on relief available through the Simplified-SAC method and increased the relief available under the Three-Benchmark method to \$4 million based on the Board's conclusion that the cost of litigating a Simplified SAC case would be in the \$4 million range.

The removal of the limit on relief was meant to increase the use of the Simplified-SAC method over Full-SAC analysis to reduce the cost of large rate reasonableness proceedings.⁹⁰ With removal of the limit however, the STB decided to increase the precision of the Simplified-SAC analysis by modifying the Road Property Investment (RPI) portion of the analysis. Previously, the RPI analysis for Simplified-SAC cases (used to compute the fixed costs of the railroad) was analyzed using the results of past Full-SAC cases. The Simplified-SAC method now requires a full RPI analysis to be completed, estimating the fixed cost of the SARR.

Complexity of the Full-SAC Procedure

Despite their lower costs and reduced complexity, the simplified procedures have not been heavily used since their introduction. As noted, only five Simplified-SAC procedures have been initiated, and all of them were settled by the railroad and shipper. Five Three-Benchmark procedures were also initiated, four of which were settled and one was decided by the STB (a finding of unreasonable rates). In contrast, the STB noted in its *Rate Regulation Reforms* decision that shippers have mainly used the Full-SAC test and that Full-SAC presentations are becoming more and more complex. The STB observed that some of the early SAC submissions were relatively short but had later grown to hundreds or thousands of pages in length.⁹¹

⁸⁸ STB Freight Rail Rate Cases: http://www.stb.dot.gov/stb/industry/Rate_Cases.htm

⁸⁹ See for example, Burton, Mark, *The Economics of Evolving Rail Rate Oversight: Balancing Theory, Practice, and Objectives*, 81 J. of Transp. Law, Logistics & Policy 267-293 (2014).

⁹⁰ The STB reasoned that both the Full- and Simplified- SAC methods are designed to prevent railroads from abusing market power. The simplified method, however, does not provide the same level of precision as the full method. Nevertheless, it is still able to detect abuse of market power, and the STB determined that it did not need to limit the level of rate relief.

⁹¹ For example, the Opening Statement of Otter Tail in the STB Docket No. 42071, *Otter Tail v. BNSF*, is more than 2,000 pages in length.

In 2012, agricultural shippers claimed that the Full-SAC approach was not appropriate for their industry. Since they use many origin-destination pairs, the Full-SAC procedure can become very complicated with multiple interchange points and service configurations leading to a very high litigation cost. They also claimed that even the Simplified-SAC and the Three-Benchmark procedures were too complex and too costly relative to the expected benefits.

In the case of the Full-SAC procedure, the STB noted that the complexity of the cases often arises from shippers designing very complex railroads with extensive networks to maximize the contribution of “cross-over traffic”⁹² which moves on an actual railroad to the revenues of the hypothetical railroad. By seeking to maximize the contribution of the cross-over traffic, shippers are trying to take advantage of the revenue effect of the economies of scope to effectively lower the average variable cost of the traffic at issue. However, it is not clear whether shippers are effectively taking advantage of all the economies of scope the network can produce. The following chapter examines the issue of the economies of scope in the Full-SAC test.

The STB noted that the complexity of the cases often arises from shippers designing very complex railroads with extensive networks to maximize the contribution of “cross-over traffic.”

⁹² “Cross-over traffic” refers to movements included in the traffic group that would be routed over the Stand-Alone Railroad for only part of its through movement. The use of cross-over traffic allows the complaining shipper sponsoring the SARR to avoid the need to replicate all of the incumbent railroad’s services. Rather, the assumption is that the SARR would interchange traffic with the residual portion of the incumbent railroad’s system. *Major Issues*, slip op. at 24.

3 Economies of Scope and Ramsey Pricing

Among the core economic principles underlying the STB’s Constrained Market Pricing policy are

- recognizing the benefits from economies of scope; and
- the use of Ramsey pricing principles for achieving railroad revenue adequacy as well as the greatest economic efficiency or national welfare from railroad assets and services conditional on carriers being revenue adequate.⁹³

Economies of scope arise in the railroad industry because of the presence of joint and common costs. Joint and common costs in the railroad industry generally appear when the railroads use the same tracks and other infrastructure to serve different shipments by various shippers of a range of commodities such as coal, agricultural products, chemicals, fertilizers and forest products, among others.⁹⁴ These common costs are not directly attributable to individual shipments, or even particular commodities. Because of the presence of joint and common costs, marginal cost pricing methods do not allow railroads to recover all their costs from the shippers. Thus, the multi-product characteristic of the railroad leads to complex pricing issues: railroads, to be revenue adequate, need to cover joint and common costs that are not allocable to any specific traffic movement.

Among the core economic principles underlying the STB’s Constrained Market Pricing policy are

recognizing the benefits of economies of scope; and

using Ramsey pricing principles for achieving railroad revenue adequacy as well as the greatest economic efficiency or national welfare from railroad assets and services conditional on carriers being revenue adequate.

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.⁹⁵ The ICC in *Coal Rate Guidelines* concluded that “a meaningful maximum rate policy could not be founded on a strictly cost-based approach. Because competition compels the railroads to provide some of their services below an arbitrarily assigned ‘cost’, they must be able to price other services above their assigned ‘cost’ in order to compensate.”⁹⁶

By contrast, economists generally favor the concept of “Ramsey pricing” – a pricing principle that allows firms to set their prices above the marginal cost to cover their common and fixed costs. This is achieved

⁹³ See generally, *Coal Rate Guidelines*, 1 I.C.C.2d at 525-28.

⁹⁴ Bereskin, C. Gregory, *Railroad Economies of Scale, Scope, and Density Revisited*, 48 J. of the Transp. Research Forum 23-38 (2009): <http://ageconsearch.umn.edu/bitstream/207130/2/2261-4266-1-PB.pdf>

⁹⁵ Baumol, “Minimum and maximum pricing,” 235-248.

⁹⁶ *Coal Rate Guidelines*, 1 I.C.C.2d at 523.

by having the markup for each shipper as a percentage that is proportional with the inverse elasticity of demand for the traffic to be carried. In plain language, this means that some shippers will pay rates with only modest markups above variable cost because their price sensitivity is so high that rates that are any higher will drive them off the rail system; while other, less price sensitive shippers will need to pay higher rates to ensure the viability of individual rail lines.

This 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.

In practice, regulators cannot directly apply Ramsey pricing to railroad rates because it is cumbersome to compute inverse demand elasticities. As well, strict application of Ramsey pricing rules requires solving the optimal rates for all shippers on the line in order to establish the rate for one shipper. The regulatory alternative is to allow a form of differential pricing under which “railroads are left free to set prices over a fairly wide range, albeit with specified end points on the range. Rail firms use this freedom to extract larger contributions towards fixed costs from some customers than from others, according to conditions in different markets.”⁹⁷ The floor price is theoretically established as marginal cost. The well-known criterion to define the ceiling lies in the concept of the stand-alone cost test.⁹⁸ The stand-alone cost test is used as a proxy for Ramsey prices that ensures rates do not exceed the rate that the market would impose if it were subject to competition.

The *Coal Rate Guidelines* established the Constrained Market Pricing (CMP) principles as the regulatory mechanism to be applied to analyze the reasonableness of rail rates. CMP’s objectives can be summarized as:

*A captive shipper should not be required to pay more than is necessary for the carrier involved to earn adequate revenues. Nor should it pay more than is necessary for efficient service. And a captive shipper should not bear the cost of any facilities or services from which it derives no benefit.*⁹⁹

Under the SAC test, a shipper challenging a rate must design a hypothetical stand-alone railroad (SARR) to determine whether it is paying for inefficiencies in the railroad’s investment or operations or the serving railroad is unreasonably exploiting its market power by charging more than the SARR would need to charge to serve the traffic at issue and other traffic that could be profitably served on the new railroad. The SAC test is based on a comparison between the rate obtained by simulating the financial requirements of this hypothetical efficient stand-alone railroad that would serve the traffic at issue and the rate proposed by the railroad for this traffic to judge the rate’s reasonableness.

⁹⁷ Beshers, Eric, “Efficient Access Pricing For Rail Bottlenecks,” Report Prepared for Volpe National Transportation Systems Center in Support of Federal Railroad Administration, U.S. Department of Transportation (Washington, DC, 2000), 4, https://www.fra.dot.gov/eLib/details/L03017#p1_z5_gD_kbeshers

⁹⁸ Baumol, “Minimum and maximum pricing,” 235-248.

⁹⁹ *Major Issues*, slip op. at 6-7.

In *Coal Rate Guidelines*, the ICC contemplated that a SARR would include all of the network and facilities required to serve the transportation needs of the selected traffic group. In practice, however, it became apparent that such a requirement would risk making the Full-SAC test wholly unmanageable due to “economies of traffic density” and “economies of scope.” Economies of density reflect the decrease in average total costs as output (i.e., traffic) increases on a particular origin-destination pair. Economies of scope reflect the decrease in average total costs when the railroad consolidates traffic from different unique origin-destination pairs on a given rail line. The problem for the design of the Stand-Alone Railroad is that to generate economies comparable to those enjoyed by the incumbent railroad whose rates are being challenged, the SARR would have to carry comparable volumes of traffic, all of which would likely be coming from and going to many different locations. Without some method of simplifying the inquiry, a complaining shipper would likely have to hypothesize a SARR that replicated virtually the entirety of the incumbent’s system. The solution to this problem was to allow the SARR to serve some “cross-over traffic”, which allowed the complaining shipper to include sufficient traffic other than its own in its traffic group to achieve economies of density comparable to those enjoyed by the incumbent railroad without having to replicate the entirety of the incumbent’s system.

But the use of cross-over traffic created its own issues in rate cases. Over the years, it appears that SAC cases are becoming increasingly complex with shippers creating hypothetical railroads with routes specifically designed to get additional cross-over traffic and to maximize the benefit from economies of scope, rather than focusing on a more direct or efficient routing for their own for traffic. Allowing the shipper to include cross over traffic addresses the revenue side of economies of scope, but it does not necessarily address all the potential average cost reductions arising from economies of scope.

This chapter examines the basics of the costing issue for the railroad industry. In particular, the first section recalls the theoretical fundamental of pricing in multiproduct firms and the importance of Ramsey pricing in industries that exhibit economies of scope and scale. Ramsey pricing leads directly to the SAC test to identify cross-subsidies in the context of a multiproduct firm having economies of scope and subject to a zero profit constraint.¹⁰⁰ The second section examines a recent discussion between Gerald Faulhaber¹⁰¹ and Robert Willig about the economies of scope issue in the SAC test.¹⁰²

3.1 Optimal Pricing for Multiproduct Firms: Ramsey Pricing

This section provides a background technical discussion of economies of scope and Ramsey pricing. In order to be precise, and because there is a debate among some professional economists on this topic, it is done using the technical parlance and mathematics of economists. Section 3.3 returns the discussion to how the Stand-Alone Cost test relates to Ramsey pricing.

¹⁰⁰ Faulhaber, Gerald R. “Cross-Subsidization: Pricing in Public Enterprises.” *The American Economic Review* 65, no. 5 (1975): 966-977.

¹⁰¹ Gerald Faulhaber, in addition to publishing papers, has also testified before the STB on behalf of The Concerned Shipper Associations (e.g., Ex Parte No. 722, *Railroad Revenue Adequacy*, Reply Comments submitted by Concerned Shipper Associations, filed Nov. 4, 2014). The CSA consists of the American Chemistry Council, The Fertilizer Institute, The Chlorine Institute, and The National Industrial Transportation League.

¹⁰² Robert Willig, in addition to publishing papers, has also testified before the STB on behalf of the Association of American Railroads (e.g., Ex Parte No. 722, *Railroad Revenue Adequacy*, Reply Comments of The Association of American Railroads, filed Nov. 4, 2014).

Multi-product Firms and Economies of Scope

Multi-product firms are those firms that use the same production factors (labor, capital, fuel, and materials) to produce different products or services. The railroads are multi-products firms as they use any particular piece of track to serve shippers having different traffic characteristics such as length of haul, weight, volume, competitive environment or commodity mixes. As shippers share the same track and other operating facilities and resources, the presence of joint and common costs can give rise to economies of scope. Economies of scope are those economies that arise in multiproduct firms when

*there is also the possibility that cost savings may result from simultaneous production of several different outputs in a single enterprise, as contrasted with their production in isolation, each by its own specialized firm.*¹⁰³

Baumol, Panzar and Willig note that economies of scope are a restricted form of subadditivity.¹⁰⁴ (Subadditivity is a more general concept of cost functions that means that it is less costly to produce a quantity of a good in one firm than to divide the production in several firms.) They mathematically defined subadditivity as follow:^{105 106}

a cost function is strictly subadditive at y if for any and all quantities of output $y^1, \dots, y^k, y^j \neq y, j = 1, \dots, k$, such that $\sum_{j=1}^k y^j = y$ we have

$$C(y) < \sum_{j=1}^k C(y^j)$$

The concept of economies of scope is more specific as it refers to different products instead of quantities. Baumol, Panzar and Willig modify this definition of subadditivity and provide a formal mathematical definition where there are economies of scope at y_s if:

$$\sum_{i=1}^k C(y_{T_i}) > C(y_s)$$

¹⁰³ Baumol, William J., John C. Panzar and Robert D. Willig, *Contestable Markets and the Theory of Industry Structure* (New York: Harcourt Brace Jovanovich, Inc., 1982), 71.

¹⁰⁴ Ibid.

¹⁰⁵ Ibid., 17.

¹⁰⁶ Difficult concepts in economics, especially those with subtleties, are often expressed mathematically to be clear and precise. As an example, a term such as ‘cross subsidy’ may seem to be straightforward, but in practice it can mean different things to different people and in different contexts. The economics profession thus has tended to use mathematics to be more clear and precise as to exactly which concept is being discussed and analyzed. This has been of great benefit to the profession, although at the expense of broader participation in the dialogue. Reluctantly, this study has a few passages where we use mathematics because the subtle concepts have been and continue to be debated in mathematics by some leading researchers. This study wishes to be clear in the context of these debates. An attempt is made to also state the key propositions in plain English – well in plainer English than the mathematics.

With $U_i T_i = S, T_i \cap T_j = \emptyset$ for $i \neq j, T_j \neq \emptyset$, and $k > 1$.¹⁰⁷

This means that the total cost of producing each product in isolation is greater than the cost of producing them jointly. Economies of scope refer to a multiproduct firm cost advantage: the firm benefits from the cost reducing effect of using common production factors or inputs.

In the U.S. railroad industry, some costs are shared and generally not specific to any particular traffic. Such costs are incurred to service all traffic and are not assignable to any specific movement. For example, costs related to depreciation, maintenance and repair or snow clearance of a railroad may be incurred for the benefit of all traffic moving over a line and are shared in common. Some shared costs are fixed and do not vary with traffic levels.

In such a situation, if each product is priced at marginal cost, then the railroad would be unable to cover the common cost. As a result, pricing at marginal costs prevents the railroads from achieving normal economic profits and attracting the proper level of investment to sustain an efficient service in the long run.

Ramsey Pricing

Marginal cost pricing is the process of setting the price at the same level as the marginal cost. Such a practice is generally called the “first best” pricing because it is the price that maximizes the total national economic welfare from resources used to provide services. Economists will refer to this as maximizing surplus (consumer and producer) in the economy. Unfortunately, in industries with economies of scale (or traffic density or scope) or with common/joint costs, pricing at marginal cost will leave the fixed or common/joint costs uncovered, resulting in a loss. Such an industry can only achieve “first best” economic welfare in the long run if it is subsidized.

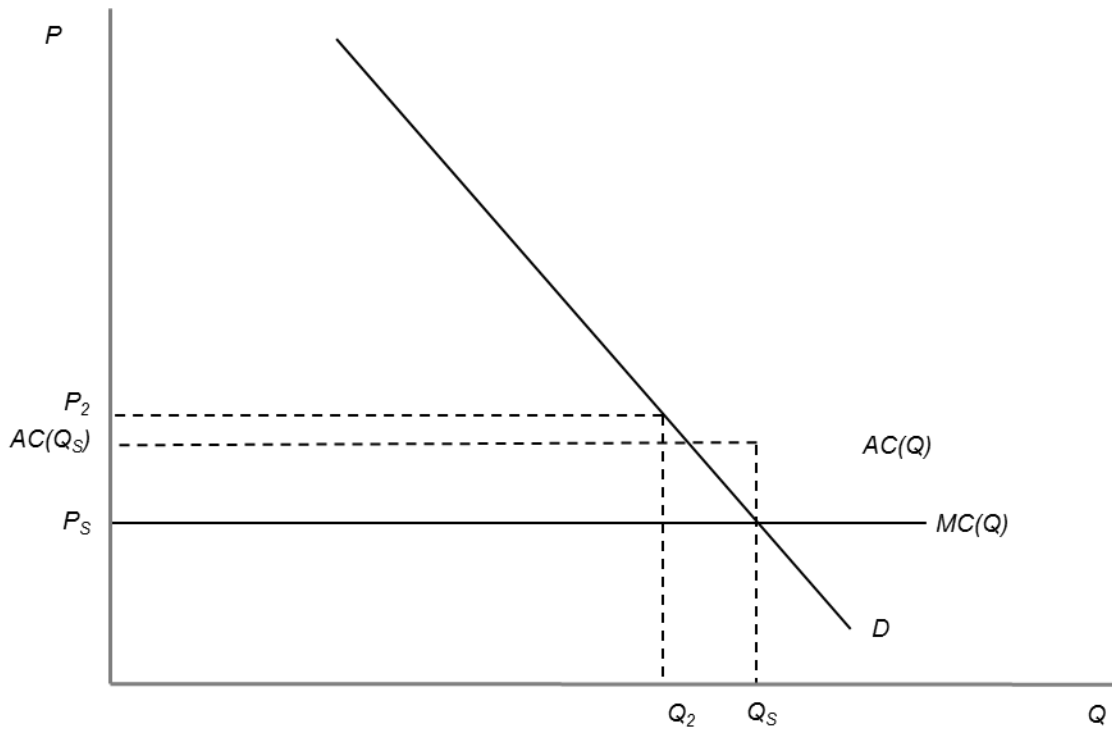
In situations where the first best pricing cannot be considered (e.g., a firm with large economies of scale or scope, high fixed or common costs which is not subsidized), economists have defined what are considered the “second best” prices.¹⁰⁸ Second best prices are those prices that maximize the total surplus subject to a constraint on profit (or in the case of railroads, subject to a revenue adequacy constraint). This means that second best pricing are those prices that allow a firm to cover its fixed and common costs with the minimum deviation from the marginal cost (minimum deadweight loss) and no subsidies. Such prices are called Ramsey prices.

Figure 3-1 diagrammatically illustrates one aspect of the Ramsey pricing concept. The Ramsey prices are obtained by adding a markup to the marginal costs. If prices are set to marginal cost, the price would be P_s . However average total costs would be $AC(Q_s)$, which exceeds price; thus the rail carrier would experience a loss. To be financially viable, the firm would need to set price so that total revenues cover total costs. If there is only one shipper on the line, then the “second best” price is P_2 . The second best price is the closest to the first best option (P_s) that also respects the revenue adequacy constraint. Indeed if the price was set below the average cost ($AC(Q_s)$), it would violate the breakeven constraint and would not permit the railroad to recover its total costs.

¹⁰⁷ Baumol, Panzar and Willig, *Contestable Markets*, 71-72.

¹⁰⁸ We apologize for this terminology but use it because it is a term of art in the economics profession.

Figure 3-1: Ramsey Pricing



Source: Replicated from Church, Jeffery and Roger Ware, *Industrial Organization, a Strategic Approach* (New York: McGraw-Hill, 2000), 787.

Ramsey prices cover the case when there are two or more shippers, and they have different price elasticities (different abilities to pay rail rates).¹⁰⁹ A diagrammatical illustration for two shippers is possible but complex. The essence is that one shipper will pay a price above P_2 , and the other will pay a price below P_2 but above P_s . The total use of railway services will be higher (i.e., higher than Q_{Ramsey}), one of the major benefits of Ramsey pricing. It enables affordable service to more traffic than would be the case with a uniform markup at P_2 .

The Ramsey prices are quite simple in theory but are very complicated to determine in practice in multiproduct firms. To illustrate the principle, assume that a multiproduct firm exists with products having

¹⁰⁹ Diagrammatically shippers with different elasticities might be shown with different demand curves, each with a different slope. For those interested, the Church and Ware book presents such a more complex diagram.

independent demands.¹¹⁰ In this case, the Ramsey number (i.e., the Ramsey pricing percent markup for a particular shipment)¹¹¹ is a function of the deviation of price from the marginal cost and of the price elasticity of the product. This is as described mathematically below:

$$\left(\frac{p_i - mc_i}{p_i}\right) = \lambda \frac{1}{|\varepsilon_i|}$$

with p_i = price of product i , mc_i = marginal cost of product i ,
 ε_i = Price Elasticity of buyer i and λ = the Ramsey number

If price equals marginal cost, the Ramsey number is zero. In this case, the price is the first best price, although the carrier may end up bankrupt. When prices need to deviate from the marginal cost to cover the fixed and common costs, the Ramsey number is not zero, it is a positive number. Ramsey pricing is also called the inverse elasticity rule because the more price inelastic the demand for a product is, the higher the mark-up above marginal cost will be.¹¹² This means that those products that have no viable transportation substitute for their movement will bear a higher share of the common and fixed costs than buyers with many viable transportation options who could leave the network and use another mode of transport.

In the U.S. freight railroad industry, Ramsey prices ensure that unattributable fixed and common costs are distributed among the services on the basis of the value of those services to shippers, as calculated by the inverse elasticity of demand.¹¹³ The demand for a service will be relatively inelastic for a shipper placing high value on this service. That means that a shipper having a relatively high value for a service would have higher markups. Shippers with relatively high price elasticity of demand, and thus a more limited ability to absorb price increases, will have lower markups so as to avoid a transfer of the market to other transportation modes.

While this is intuitively appealing as it minimizes distortions to the industry, economists almost universally agree that determining Ramsey prices in practice is difficult, particularly in the railroad industry. This is because Ramsey pricing requires solving for all of the prices the railroad charges or all the prices it charges on a particular line. It also requires the railroad to have information or knowledge about customers' price elasticity of demand, as well as the marginal costs, of all the products at issue. Such information is generally not disclosed by shippers. It would have to be estimated based on statistical analysis of different sources of information or via inferences from behavior of shippers in response to price changes.¹¹⁴

¹¹⁰ Ramsey pricing can be developed for cases where demand are dependent, but the mathematics and empirical methods are more complex. An example of dependent demands might be shipments of grain and shipments of fertilizer.

¹¹¹ This is represented by the left hand side of the equation: Markup over price is percent markup.

¹¹² Church, Jeffery and Roger Ware, *Industrial Organization, a Strategic Approach* (New York: McGraw-Hill, 2000), 790.

¹¹³ Baumol, William J. and Robert D. Willig, "Pricing Issues in the Deregulation of Railroad Rates," In *Economic Analysis of Regulated Markets*, ed. Jörg Finsinger, 11-47 (London: McMillan, 1983), 12.

¹¹⁴ Baumol and Willig suggested that it would be sufficient to compute the price elasticity of demand as well as the marginal cost for an entire category (or commodity) and to use this average elasticity of demand and average

For these reasons, the STB cannot directly apply Ramsey pricing. The ICC explained in *Coal Rate Guidelines* that it was not practical to directly use Ramsey pricing as a regulatory method because “the amount of data and degree of analysis required seemed overwhelming.”¹¹⁵ Instead, as an approximation of Ramsey Pricing, the ICC decided to allow railroads to engage in differential pricing within a range created by the CMP principles.¹¹⁶ Rates that cover variable costs and make a small contribution to common and fixed costs represent the floor. The ceiling is represented by rates that a hypothetical efficient stand-alone railroad would charge to provide the service on its own (the stand-alone cost). Theoretically, prices that ensure the railroad is revenue adequate and cover all its costs lie within this band.¹¹⁷

The Stand-Alone Cost Test and Ramsey Pricing

Faulhaber. The STB’s SAC test is intrinsically linked to the concept of economies of scope. The concept eventually utilized by the STB in setting up CMP was first described by Gerald Faulhaber in 1975.¹¹⁸ The original concern was to define a criterion to identify whether a group of consumers of a public multi-product firm was being cross-subsidized by another group of consumers. The main objective of the cross subsidy analysis was to ensure that each consumer is paying no more for a service than the consumer would pay otherwise (i.e., in the absence of cross-subsidization).

Faulhaber analyzed the issue of cross-subsidization using an “n-person cooperative game”. The necessary conditions for his demonstration are that the firm is a natural monopoly, benefits from economies of joint production (i.e., economies of scope), and is subject to a zero profit constraint and no cross-elasticity.

He showed that under these specific conditions, the price of providing a set of services to a group of customers is lower than the cost of providing each service individually. (Another way of saying this is that if there are economies of scope, a customer is better off with other customers on the network, even if they end up paying somewhat less per unit.) He defined the stand-alone cost of a service or of a group of services as the minimum amount per unit it would cost to provide the service or group of services if it

marginal cost as an informative indicator for each service and movement if the movements in the category are homogeneous. *Ibid.*, 40.

¹¹⁵ *Coal Rate Guidelines*, 1 I.C.C.2d at 527. The authors of the current study are of the view that today, in the era of ‘big data’ and big processing power, computing reasonable Ramsey price estimates may be possible, although challenging. When the Staggers Act was passed, the IBM PC had not been invented. At the time the CMP was established, the internet as we know it today did not yet exist, and thus “big data” was nonexistent. However, there will still be an issue as to whether the courts would uphold a decision based on a Ramsey Pricing calculation. It is a method that implies solving for all the rates charged by a railroad, and this would raise issues as to whether the data on other shipments meets the tests of verifiability and transparency.

¹¹⁶ As the ICC explained: “Under CMP, the carriers are expected to use the market demand which they observed as the basis for their pricing, but they need not calculate the precise elasticity of demand for every movement. . . . We are satisfied that the constraints and incentives CMP contains should lead to rates approximating Ramsey prices and protect captive coal shippers from possible carrier abuse of pricing discretion.” *Ibid.*, 527-28.

¹¹⁷ But revenue inadequacy is not a defense to a complaint that a railroad is charging a shipper more than a properly designed SARR would charge for the same service.

¹¹⁸ Faulhaber, Gerald R. “Cross-Subsidization: Pricing in Public Enterprises.” *The American Economic Review* 65, no. 5 (1975): 966-977.

were offered by a single-product supplier. If the stand-alone cost is lower than the cost under joint production, then individual companies have an incentive to provide the service on their own (or find someone else to provide it). The stand-alone cost is then the upper limit above which each individual company has an incentive to provide the service itself.

Faulhaber showed that under joint production, each company benefits from the cost reducing effect of economies of scope. If one individual company decides to provide the service by itself, it would lose the cost reducing effect from economies of scope. Faulhaber also noted that for any service that is priced at the stand-alone cost, that service, like a company providing the service itself, would not benefit from economies of scope or scale.¹¹⁹

Baumol and Willig. In 1983, Baumol and Willig further articulated these concepts in the context of the U.S. rail industry.¹²⁰ Their work aimed to provide sound economic principles behind rate regulation in the case of unsubsidized railroads. The authors demonstrated that there are economic principles that promote economic efficiency and ensure rail carriers can earn adequate revenues when traffic is experiencing economies of density.

These principles led the authors to embrace Ramsey pricing. They concluded that Ramsey prices were best suited for regulating the U.S. rail industry, because such prices would allow railroads to recover their fixed costs while maximizing total economic surplus in an industry subject to revenue adequacy constraint.

But because Ramsey pricing was not possible in practice, the ICC adopted CMP to approximate the Ramsey pricing rates.¹²¹ In particular, CMP introduced the SAC test in the U.S. railroad industry based on the underlying theory of contestable markets. As the ICC explained, CMP

establishes constraints on the pricing freedom of the railroads which induce them to price all traffic efficiently. As with Ramsey pricing, services are priced according to market demand and to cover only the total costs of an efficient carrier. CMP will have defined the total amount of unattributable costs to which the shipper must contribute and focused on the traffic which can reasonably be expected to pay those costs. At that point, market forces will largely determine the share of the costs to be borne by each shipper. The result of the process is a rate structure which reflects long-run marginal costs, demand elasticity and differential pricing of unattributable costs-the same result that occurs under Ramsey pricing.¹²²

The theory was extensively addressed (mathematically) by Baumol, Panzar and Willig in their 1982 book *Contestable Markets and the Theory of Industry Structure*. There, the authors showed that even in a

¹¹⁹ Faulhaber, Gerald R., “Verified Statement – Stand-Alone Cost – Response to Comments,” Ex Parte No. 722 (Sub-No. 2) Railroad Revenue Adequacy and Ex Parte No. 664 (Sub-No. 2), Petition of the Western Coal Traffic League to Institute a Rulemaking Proceeding to Abolish the Use of the Multi-Stage Discounted Cash Flow Model in Determining the Railroad Industry’s Cost of Equity Capital, Reply Comments submitted by Concerned Shipper Associations, Exhibit A, (Nov. 4, 2014): 8.

¹²⁰ Baumol and Willig, “Pricing Issues,” 11-45.

¹²¹ *Coal Rate Guidelines*, 1 I.C.C.2d at 527-34.

¹²² *Ibid.*, 534.

monopolistic situation, the multi-product incumbent under certain conditions will be constrained in its pricing by the threat of competitive entry. A contestable market is one where

potential entrants can, without restriction, serve the same market demands and use the same productive techniques as those available to the incumbent firms ... and evaluate the profitability of entry at the incumbent firm's pre-entry prices.¹²³

In practice. The U.S. railroad industry is far from being a contestable market in practice. A potential entrant would have to invest significantly in infrastructure to compete with the incumbents. These considerable sunk costs prevent any potential competitor from easily entering the market. Nevertheless, the regulator can assess rates as if the market were contestable by asking what costs would be for an efficient entrant, and what other traffic is available to create price reducing economies of scope for the issue traffic.

To be considered as a potential entrant, the hypothetical SARR must be defined as if the railroad industry was a contestable market. This situation requires three conditions.

- The first is that competitors can enter the market without bearing a high cost of entry and exit. The CMP allow shippers to simulate a stand-alone cost by removing all advantages (entry and exit barriers) of the existing carriers industry: "The costs and other limitations associated with these entry and exit barriers must be omitted from the SAC in order to approximate the cost structure of a contestable market".¹²⁴
- The second, known as the subadditivity condition, is that the incumbent is able to produce at a lower price than a market with two or more competitors mainly due to economies of scale (i.e., economies of traffic density) and economies of scope.
- The third and last condition, known as the sustainability condition, is that the prices are such that the firm earns zero economic profit. In other words, it does not have a loss and only earns a fair rate of return, rather than an excessive profit that would attract entry into the market.

Economies of Scope in the Stand-Alone Cost Test

The SAC model, as developed under the CMP principles, takes into account the revenue effect from economies of scope by incorporating all possible cross-over traffic for the SARR. However, it is unclear whether the Full-SAC test accounts for the cost reducing effect of the economies of scope. **Figure 3-2**

¹²³ Baumol, Panzar and Willig, *Contestable Markets*, 5.

¹²⁴ *Coal Rate Guidelines*, 1 I.C.C. 2d at 529.

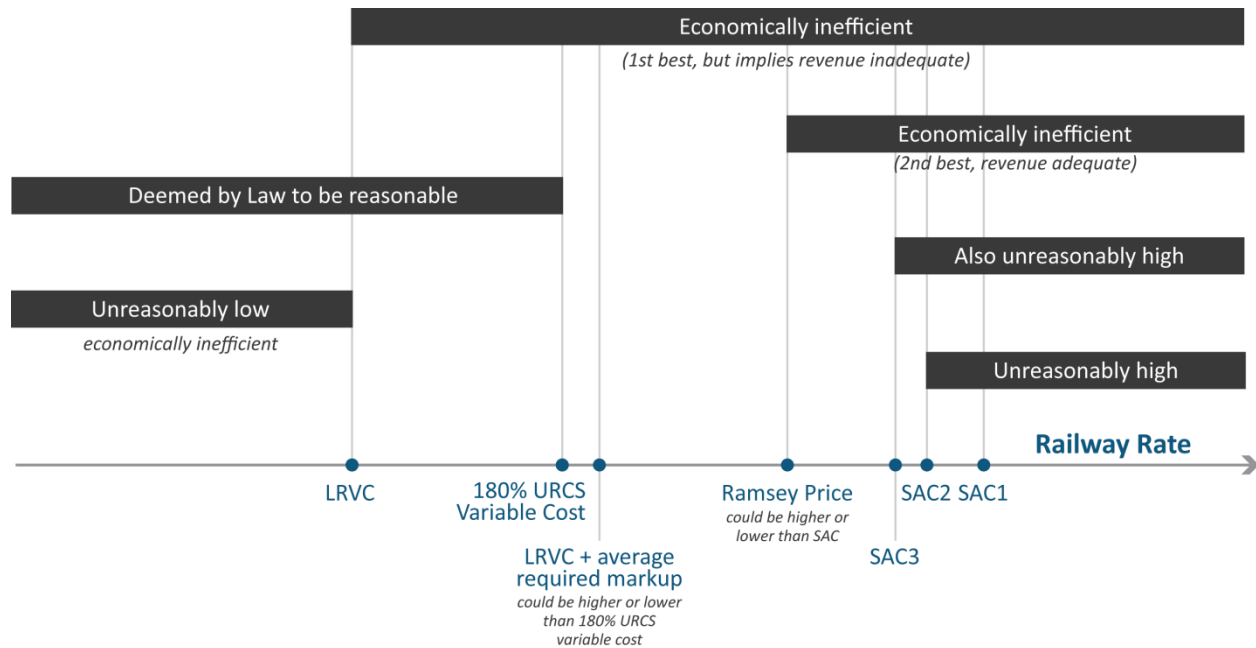
The U.S. railroad industry is far from being a contestable market in practice.

Nevertheless, the regulator can assess rates as if the market were contestable by asking what costs would be for an efficient entrant, and

what other traffic is available to create price-reducing economies of scope for the issue traffic.

illustrates the different costs of traffic on the railroad industry and how different SAC determinations might compare to those rates.

Figure 3-2: Different Measures of Rate Reasonableness



Source: InterVISTAS representation

Note: As described earlier, the statutory test is 180% of variable costs as determined under URCS. URCS is a measure of intermediate-term variable costs on a system-average basis that includes costs (such as return on road property investment) that are fixed in the short term. E.I. DuPont De Nemours & Co. v. CSX Transp. Inc., NOR 42099, slip op. at 19 (STB served June 30, 2008).

To begin the discussion of rate reasonableness, we start at the left of the diagram.

- Economic efficiency requires that any shipment on a rail line must at least cover its marginal costs (in the railroad industry, marginal costs are estimated as long run average variable costs – LRVC). Hence any rate below LRVC is deemed to be economically inefficient, hence unreasonably low.
- As noted, any rate below 180% of URCS Variable Costs is deemed by law to be not the result of market dominance, hence is assessed as a matter of law as not being unreasonably high.

Any rate above stand-alone cost is deemed by Faulhaber, Baumol & Willig and by CMP to be unreasonably high. However, there are a number of different concepts of what constitutes stand-alone cost, so the diagram indicates each.

- Stand-alone cost SAC1 is the cost incurred by a shipper if it were to form its own company providing the transportation service for the traffic at issue but no other traffic would use the line. This concept -- SAC1 -- is deficient as it does not allow the shipper to reap the benefit of economies of scope from other traffic that could use the line of the SARR. In the STB’s parlance,

SAC1 does not offset the costs of the SARR using potential revenue from “cross-over traffic”. Thus, SAC1 is considered unreasonably high as it does not allow the shippers to benefit from any economies of scope.

- SAC2 is the point where the revenue contributions from the other traffic utilizing the line are taken into account. SAC2 recognizes the benefits of economies of density/scope by modeling the SARR with traffic other than the complainant shipper. It takes into account the revenue benefit to the shipper from adding additional cross-over traffic to the SARR. SAC2 seems to embody the concept of economies of scope envisioned by Baumol and Willing. Any rate above SAC2 is unreasonably high.
- SAC3 is similar to SAC2 but is also reduced by any marginal-cost-reducing effects from economies of scope. Indeed, economies of scope should reduce variable costs because there are certain costs that could be partially allocated to other traffic (bridge traffic). SAC3, like SAC2, reduces the costs that the shipper must bear by recognizing the revenue contribution from other (cross over) traffic that can use the line of the SARR. However, economies of scope would not only produce the revenue benefit from such cross over traffic, it could also reduce the unit cost of providing service. This does not seem to be explicitly recognized in the Baumol and Willing discussion of economies of scope in CMP, but Faulhaber does seem to recognize it. The conclusion of this report is that any rate above SAC3 should also be deemed to be unreasonably high.

An issue is whether the STB’s current SAC test allows SAC3. It is our view that it does. The computation of offsetting revenue contribution from cross over traffic is a computational step in the STB’s SAC methodology. There is no explicit step for the cost reducing effect of economies of scope, but the STB’s discussion of CMP and SAC invite the shipper to make use of all available benefits of economies of scope. Thus, the STB’s SAC method is a SAC3 construct.

To complete our discussion, we have introduced two other price levels in the diagram.

The Ramsey price would be the actual Ramsey price if it were computable. The SAC is an approximation to the un-computable Ramsey price. The diagram shows the Ramsey price as being a bit below SAC3 (to keep the diagram legible), but it could be somewhat above as well.¹²⁵ A rate should be judged unreasonable if it exceeds either the SAC or the Ramsey price. Because the latter cannot be computed, the SAC test must be used to judge rate reasonableness. Another price level added to the diagram (labeled “LRVC + average required markup”) involves abandoning differential pricing (Ramsey pricing) and applying the same markup percentage to all traffic. This is one of the concepts proposed in the rate reasonableness test used by the Federal Communications Commission for access prices to the telecommunications infrastructure of the large telecom carriers. (This will be discussed in Chapter 7.)

¹²⁵ An example of Ramsey pricing being above SAC3 would be a case where the issue traffic is extremely price inelastic. For example, some years ago metallurgical coal for export was selling in the \$75 range in world markets, and then the price jumped for a period well over \$150, and in some cases was selling at over \$300. If the coal was able to pay the rail rate at \$75, at higher coal prices the coal shipper would be able to pay (much) higher rail rates. In this high coal price situation, coal shippers would have been extremely insensitive to rail rates and computation of Ramsey prices with the inverse elasticity rule could produce Ramsey prices which far exceeded the SAC test.

However, while such rates are easy to compute, we know that they are not economically efficient. They produce a lower level of economic surplus than Ramsey prices (or SAC rates). Such rates may be very attractive to shippers with low elasticities (price-insensitive traffic) who are currently paying rates with high markups. However, by applying a uniform markup, the more price sensitive traffic will face rates that would cause them to switch to less expensive alternatives or to cease doing business. This reduces the economic surplus from rail infrastructure and services. It will also result in either revenue inadequacy for the carrier, and/or start an upward rate spiral. Each price sensitive shipper that is lost to the system will cause a re-computation of the average percentage markup, which will necessarily be higher. This in turn may induce the next level of price sensitive shippers to leave the system.

Appendix I includes a detailed discussion of the technical and academic debate, particularly between Faulhaber and Willig, concerning on the SAC concept, particularly as it relates to economies of scope.

4 Rate Reasonableness Standards and Challenges in Their Uses

Chapter 2 introduced the tests under which the STB examines the reasonableness of rates charged by railroads. This chapter provides greater detail on those tests – the Full-SAC procedure and the two subsequent simplifications of that procedure, the Three-Benchmark procedure and the Simplified-SAC. This chapter also examines the main challenges that have emerged since their introduction.

The Full-SAC procedure is STB’s primary regulatory process through which a shipper may seek relief on rates it believes are unreasonable and determines if it is bearing the cost of inefficiencies or the cost of railroad facilities from which it derives no benefits. To make its case, a shipper must provide evidence that a rate is unreasonably high by simulating what the rate would be in a contestable market. In practice, this means that the shipper has to design an efficient hypothetical stand-alone railroad (SARR) that would serve the traffic at issue. The Board then compares the competitive rate of this hypothetical SARR with the challenged rate to decide whether the latter is reasonable or not.

The complexity and cost associated with the Full-SAC procedure eventually led to the introduction of two other procedures for determining rate reasonableness, the Three-Benchmark procedure and the Simplified-SAC procedure. The Three-Benchmark procedure was introduced in 1996, with a methodology based on benchmarks developed by the STB. In 2007, the Simplified-SAC method was introduced, with a methodology mirroring the Full-SAC analysis, but with a set of assumptions that aim to reduce the cost and time needed to complete a SAC analysis.

4.1 The Full-SAC Procedure

4.1.1 The Market Dominance Inquiry

The STB does not have jurisdiction to review the reasonableness of a rate unless the railroad is shown to have and exercise “market dominance” over the shipper. To begin an examination of the question of market dominance, the first issue to be examined is the level of the rate being charged in relation to the railroad’s costs. Congress established that any rate with an R/VC ratio below 180% is not market dominant.¹²⁶ If a contested rate has an R/VC ratio greater than 180%, the railroad it is not automatically presumed to be a result of market dominance.¹²⁷ Rather, the shippers must demonstrate that the carrier is in a market dominant position based on the absence of effective competition from other rail carriers or modes of transportation for the shipment.¹²⁸

The R/VC ratio compares the revenue derived from the rate to the railroad’s variable costs for the movement. Prior to 2006, the ICC and the STB allowed parties to propose “movement-specific adjustments” to URCS (the STB’s regulatory costing system) to reflect what they believe is the best estimation of the true cost of the traffic at issue. For example, in *Otter Tail v. BNSF*, BNSF developed

¹²⁶ 49 U.S.C. § 10707(d)(1)(A).

¹²⁷ 49 U.S.C. § 10707(d)(2).

¹²⁸ 49 U.S.C. § 10707(a).

variables cost using URCS and available movement specific data that BNSF incorporated in lieu of BNSF system-average costs.¹²⁹ However, in a rulemaking completed in October 2006, the STB discontinued the use of movement specific adjustments when calculating the R/VC ratio. The total variable costs are estimated using the system-average cost figures produced by URCS.¹³⁰

4.1.2 The Rate Reasonableness Standard

To determine if a rate is reasonable under the Full-SAC test, shippers must determine the lowest cost at which a hypothetical, fully efficient railroad could provide the service at issue, free from any costs associated with inefficiencies or cross-subsidization. If the rate required to cover these costs (taking into account a reasonable return for the railroad) is less than the disputed rate, then the disputed rate may be considered to be unreasonable.¹³¹

To begin, the shipper has to define a hypothetical SARR which could serve the traffic if the market was free from entry and exit barriers. This hypothetical SARR is designed to replicate the conditions of a contestable market. By simulating a contestable market, the Full-SAC procedure approximates the maximum rate that would be charged to the shipper in a competitive environment.

The Traffic Group and the Route

This hypothetical SARR is designed to serve a specific “traffic group”. The traffic group definition is a crucial and often heavily contested component of a Full-SAC test presentation. The traffic group includes the traffic at issue as well as other additional traffic (i.e., “cross-over traffic”) that could increase the SARR’s revenues and profitability. The cross over traffic includes traffic that currently uses the tracks of the defendant railroad, as well as traffic that could potentially be rerouted because of the new network configuration of the SARR (rerouted traffic). But the Board will not accept the rerouting of the traffic unless the complainant can demonstrate that the SARR will provide equivalent or better service.

To serve this traffic, the SARR must use optimal physical infrastructure (tracks, yards, interchange points, motive power, etc.). These physical infrastructure elements are specified in a detailed operating plan that includes the total investment needed as well as the total operating cost it would incur for the service. The revenue expected from the SARR is then estimated, and the rates that the SARR would charge are compared to those charged to the captive shipper. These computations are made for a long term period of time, such as 10 to 20 years, and a discounted cash flow analysis is used to compute, by year, the rate the shipper must pay.

In SAC cases, shippers have considerable flexibility in the selection of the traffic group to take advantage of economies of scales, scope and of traffic density. While the traffic at issue cannot be modified, shippers are authorized to adjust the traffic by adding cross-over traffic and/or rerouting certain traffic using the parts of the hypothetical SARR.

¹²⁹ See STB Docket No. 42071, *Otter Tail Power Co. v. BNSF Railway Co.*, “Opening Evidence of The Burlington Northern and Santa Fe Railway Company,” II-1 (filed June 13, 2003).

¹³⁰ *Major Issues*, slip op. at 59-61.

¹³¹ *Major Issues*, slip op. at 7-8.

The traffic group takes into account the type of traffic, the amount of traffic, the density, the distance, the speed, the terrain, the train length and frequency as well as all parameters needed to define the traffic.¹³² These parameters affect the physical infrastructure that is needed to support such traffic. The traffic group definition is crucial to the complaining shipper because it allows the shipper to maximize the economies of scope in its SARR and increase its operational revenues. Any changes in the scope of the traffic to be included (specifically cross-over traffic) have a direct impact on the design of the SARR, and certain errors in the definition of the traffic can lead to the dismissal of the case. In *Otter Tail v. BNSF*, the case was eventually dismissed because one portion of the traffic was subsidizing another.¹³³

Cross-over traffic

Cross-over traffic is the traffic that would not originate and terminate on the SARR but would be interchanged with a residual portion of the railroad system. The ICC in *Coal Rate Guidelines* recognized that complaining shippers could lower the costs of their SARRs by taking advantage of economies of density.¹³⁴ In the *Xcel Energy v. BNSF* case, the cross-over traffic was the predominant source of revenue; it represented 90% of the traffic served by the SARR.¹³⁵ While adding cross-over traffic allows shippers to improve the efficiency of their SARRs, it also introduces complexity in the estimation of the revenue effect of this traffic. The issue that arises with including cross-over traffic is how best to allocate the revenue from the traffic between the on- and off-SARR segments, based on the cost of facilities needed to serve the traffic. This issue is one of the major sources of dispute between the parties in SAC cases.

When cross-over traffic was first permitted in a SAC analysis, there was no set method to allocate its related revenue. Early cases used a mileage-based approach to allocate revenue, the “modified mileage block prorate” method.¹³⁶ Under this methodology, the carrier would be allocated revenue based on its share of “blocks” (a carrier was given one block for every 100 miles it carried the traffic or part of the 100 miles), as well as an additional block for originating or terminating the traffic). The STB recognized there were potential issues with this methodology though, and allowed parties to suggest other methods in their analyses.¹³⁷ In 2006, the STB introduced a new method to allocate revenues, which did not have the inherent issues associated with the mileage-based method (i.e., the new method was able to take into account a railroad’s economy of density). This new methodology was the “Average Total Cost” (ATC) approach under which revenue from each segment of a movement would be allocated based on “the

¹³² Ibid., 8.

¹³³ See *Otter Tail Power Co. v. BNSF Ry.*, NOR 42071 (STB served Jan. 27, 2006), with technical corrections (STB served Mar. 27, 2006), [http://www.stb.dot.gov/Decisions/readingroom.nsf/UNID/CA03AA0FD8AA1D208525713E006C97E1/\\$file/36798.pdf](http://www.stb.dot.gov/Decisions/readingroom.nsf/UNID/CA03AA0FD8AA1D208525713E006C97E1/$file/36798.pdf).

¹³⁴ *Coal Rate Guidelines*, 1 I.C.C.2d at 29.

¹³⁵ *Public Service Co. of Colo. D/B/A Xcel Energy v. The Burlington N. and Santa Fe Ry.*, NOR 42057, slip op. at 13 (STB served Jun. 8, 2004), <http://www.stb.dot.gov/Decisions/readingroom.nsf/WEBUNID/751D1FCBAC1CF1DF852569D000726673?OpenDocument>.

¹³⁶ *Duke Energy Corp. v. Norfolk S. Ry.*, NOR 42069, slip op. at 17 (STB served Nov. 6, 2003), <http://www.stb.dot.gov/Decisions/readingroom.nsf/WEBUNID/1E47AD9DE3B66C9885256DE2006D9E73?OpenDocument>.

¹³⁷ One of the main issues was the inability to account for economies of density. Ibid.

average total cost of the movement on- and off-SARR”.¹³⁸ The average total cost per segment would be calculated using URCS.

In 2013, the STB adopted an alternative ATC method for revenue allocation. The aim of the modified method was to ensure that economies of density were still accounted for when allocating revenue but revenue allocated to a segment would not be below variable cost (addressing an issue with the original ATC method). The first step was the same as the original ATC method (using URCS to calculate the average total cost per segment, and then allocating revenue in proportion to the total average cost of the movement). The modification was adding a second step to ensure revenue allocated was not below variable cost. If that was the case, the allocation would be increased to match the URCS variable cost of the defendant carrier on a given segment (the same for both on- and off-SARR segments).¹³⁹

Rerouted traffic

A second type of traffic is rerouted traffic. This is traffic for which a shipper would change the route over which the traffic currently moves. In *Duke Energy v. Norfolk Southern*, the Board defined general guidelines to use rerouted traffic in a Full-SAC case.¹⁴⁰ Rerouted traffic is an appropriate means of removing inefficiencies from the SARR as existing routes may not be the most optimal routes to carry the traffic. However, there is a risk that rerouted traffic does not remove inefficiencies but rather inappropriately increases revenues of the SAAR network when that rerouted traffic is not part of the SARR. The Board implemented criteria to analyze whether this rerouted traffic was appropriate. One of these criteria was to check whether a rerouting shortens the distance. If it was effectively the case, the Board would presume it is acceptable.

Operating Expenses and Road Property Investment

Once the traffic group is validated, the shipper can then estimate the capital expenditure and the operating expenses required to move this traffic via the operating plan.

The operating plan simulates all the technical requirements needed by the SARR to support the traffic group and must at least provide the same level of service to shippers as the existing service provided by the incumbent railroad. It must be “realistic, i.e., consistent with real-world railroading”.¹⁴¹ The operating plan takes into account the road facilities, single tracks, passing sidings, number of trains, number of cars, type of cars, number of employees and crews, yards, etc. to permit carriage and interchange of traffic.¹⁴² Once the technical and operating configuration of the SARR is defined, the investments and

¹³⁸ *Major Issues*, slip op. at 26.

¹³⁹ *Rate Regulation Reforms*, Ex Parte 715, slip op. at 28-30 (STB served Jul. 18, 2013).

<http://www.stb.dot.gov/Decisions/readingroom.nsf/WEBUNID/60A2C167BAAB1DB185257BAC005E6235?OpenDocument>.

¹⁴⁰ NOR 42069, slip op. at 25-26 (STB served Nov. 6, 2003).

¹⁴¹ *Western Fuels Ass’n, Inc. and Basin Elec. Power Coop. v. BNSF Ry.*, NOR 42088, slip op. at 15 (STB served Feb. 18, 2009),

<http://www.stb.dot.gov/Decisions/readingroom.nsf/WEBUNID/3FE4193782B6435085257561006F3148?OpenDocument>.

¹⁴² *General Procedures for Presenting Evidence in Stand-Alone Cost Rate Cases*, Ex Parte 347 (Sub No. 3), 5 S.T.B. 441 (Mar. 9, 2001).

operating costs necessary to operate the SARR and accommodate the traffic at issue are estimated. The complaining shipper and the railroad must provide sufficient evidence to support their choices and estimates.

Operating expenses encompass train personnel, locomotive operation, maintenance, railcar, material and supply, administrative costs, training, trackage rights, loss and damage and other costs. There is no requirement that shippers use URCS in developing the SARR's costs. Generally, they develop their operating expenses using their own cost estimates and models.

The investment costs are generally presented as Road Property Investments (RPI), which includes land, roadbed preparation, track, tunnels, bridges, signals and communications, buildings and facilities, public improvements (such as fences, crossing protection, roadway signs, etc.), mobilization (i.e., movement of people, equipment and supplies to various sites), engineering and contingencies.

Each party is expected to provide credible estimates of those costs, which can lead to very different results. For example, in the *Xcel Energy v. BNSF* case, Xcel claimed that the road property investments for the SARR would cost \$900 million while BNSF claimed that it would cost \$1.8 billion. The STB eventually determined total construction cost of \$1.3 billion. In the *Duke Energy v. Norfolk Southern* case, Duke Energy estimated that the RPI would cost \$2.2 billion while NS claimed that it would cost \$5.1 billion. The Board decided that \$3.6 billion would be required to build the SARR.¹⁴³

The Full-SAC analyses requires that revenues be based on operations occurring over a multi-year period (originally 20 years) to take into account deferred taxes; the period was subsequently shortened to 10 years.¹⁴⁴ However, the SARR is assumed to operate over an indefinite period of time, and the recovery of investment for infrastructure is often assumed to occur over the economic life of the assets considered.

The Revenue Requirement Analysis

Once the operational plan, operating expenses and capital expenditures have been estimated, the complaining shipper can estimate the annual revenue requirements of the SARR using a discounted cash flow (DCF) model. The model estimates the annual revenues of the SARR that would be necessary to cover its annual total costs (capital and operation) including inflation, federal and state tax liabilities and a reasonable rate of return for the SARR. A DCF model provides the total annual revenue cash flows of the SARR, typically over a 10-year period, using projections based on the traffic forecast. Changes in costs over the period are estimated based on the Rail Cost Adjustment Factor (RCAF), approved and published quarterly by the Board.¹⁴⁵

This required revenue amount is then compared to the expected revenues from the traffic group considered over the 10-year period based on forecasted rates and traffic level trends. In order to account

<http://www.stb.dot.gov/Decisions/readingroom.nsf/WEBUNID/BAEE4CEF5A4067BF85256A03006D0FF9?OpenDocument>.

¹⁴³ NOR 42069, slip op. at 86 (STB served Nov. 6, 2003).

¹⁴⁴ *Major Issues*, slip op. at 61.

¹⁴⁵ The index used is a combination of both the RCAF-A and RCAF-U (adjusted and unadjusted for industry productivity). See *Major Issues*, slip op. at 40-44.

for the time value of money, both amounts are discounted to their present value using a cost of capital determined by the Board.

The test compares:

- the revenue that is needed to cover all costs of the SARR (RPI + operating expenses) with
- the revenue that would be generated by the traffic group handled by the SARR, which includes (a) the traffic at issue using the current carrier rate, and (b) any revenue from crossover traffic moved by the SARR.

If the present value of the revenue that would be generated by the traffic group is greater than the present value of the SARR's revenue requirement, then the rate would be considered unreasonable.¹⁴⁶

The Rate Prescription and Reparations

In *Major Issues*, the Board decided on the Maximum Markup Methodology to express the allowable SAC rate. Under this method, the STB sets a maximum R/VC ratio rather than a specific set price.¹⁴⁷ The method involves determining the contribution of traffic's variable cost towards the SAC costs. The rate will be the higher of the SAC rate and the 180% R/VC, (as the Board cannot set a rate below this level).¹⁴⁸ Another method used in past cases was one where "the Board calculated the percent reduction in the current issue rate that would reduce the total revenues from the entire traffic group down to the total revenue requirements of the SARR, and then required the defendant railroad to reduce the challenged rates by that percentage."¹⁴⁹ The Maximum Markup Methodology has the advantage of allowing the maximum rate to increase with inflation in variable costs, without the need for a new regulatory hearing.

4.1.3 Challenges in the Use of the Full-SAC

From the perspective of its use and practice, the main challenge of the Full-SAC is the complexity and costs of preparing and litigating a case. While this procedure is considered to be precise as a mechanism for determining the reasonableness of challenged rail rates, it is highly complex, requires considerable time, and is often a multi-million dollar exercise.¹⁵⁰ Beyond data collection, shippers are required to analyze a huge amount of complex data (cost evidence, simulation of operating plan, construction costs, expenses, macroeconomic data, industry data, etc.). There is also the time needed to assess the parties' results and conclusions. Such complexity and regulatory cost have raised concerns among some shippers, commentators and Congress.

¹⁴⁶ See *Major Issues*, slip op. at 8.

¹⁴⁷ *Major Issues*, slip op. at 14.

¹⁴⁸ *Arizona Elec. Power Coop., Inc. v. BNSF Ry. and Union P. R.R.*, NOR 42113, slip op. at 2 (STB served Nov. 22, 2011),

<http://www.stb.dot.gov/Decisions/readingroom.nsf/WEBUNID/B4B6654E5F913BC68525794F00735FB5?OpenDocument>.

¹⁴⁹ *Xcel Energy v. BNSF*, NOR 42057, slip op. at 36-37 (STB served Jun. 8 2004).

¹⁵⁰ See Pittman, Russell, "Against the Stand-Alone –Cost Test in U.S. Freight Rail Regulation" Economic Analysis Group Competition Advocacy Paper, (2010), <http://www.justice.gov/atr/against-stand-alone-cost-test-us-freight-rail-regulation>.

In 1996, Congress directed the STB to establish a simplified approach to the Full-SAC for those shippers whose expected relief does not justify the high cost of litigation.¹⁵¹ In 1999, the U.S. GAO reported that: “Of the shippers who expressed an opinion about the rate complaint process, ... over 70 percent believe that the time, complexity, and costs of filing complaints are barriers that often preclude them from seeking rate relief.”¹⁵² In 2007, the GAO noted that despite several efforts undertaken by the STB, there was “widespread agreement” that STB’s standard rate review process remained inaccessible to most shippers, that the cost to pursue rate relief was approximately \$3 million per litigant, which effectively prevented all but large-volume shippers from being able to afford STB’s rate review process.¹⁵³

To improve the efficiency of Full-SAC cases, STB issued procedural guidelines for the submission of evidence in SAC cases. These guidelines were designed to better focus the evidence by standardizing the format for written presentations, workpapers and electronic spreadsheets. This was intended to help the agency more efficiently and effectively evaluate the records in these cases by introducing standardization and predictability to the process.¹⁵⁴ Further, the STB has sought to develop a consistent body of precedent on key SAC case issues to reduce the number of contested issues and the time necessary to bring cases to a final decision. But because of the complexity of the industry and important nuances between individual shipments, STB has found that each case is unique and dependent on its own individual facts (e.g., route, type, amount, land, and traffic). Consequently, the process of data collection and analysis cannot be easily replicated in cases, and the extent to which the procedure’s standardization is limited.

Complexity of the SAC -- Economies of Scope

Because the rail industry is a network industry, when trying to determine the reasonableness of rates charged to captive shippers, an accurate cost analysis is necessarily a complex undertaking.

When presenting a case for rate relief to the STB, shippers are permitted to take into account in the SARR all economies of scale and scope to minimize the cost of the traffic at issue. While it is in the shippers’ interest to maximize the benefits of economies of scope in their SAC models, this practice is one of the factors that have introduced increasing complexity in the SAC procedure.

¹⁵¹ See footnote 76 and related text.

¹⁵² U.S. General Accounting Office, “Railroad Regulation: Current Issues Associated With the Rate Relief Process” at 4. (February 1999). <http://www.gao.gov/assets/160/156502.pdf>

¹⁵³ U.S. Government Accountability Office, “Freight Railroads, Preliminary Observations on Rates, Competition, and Capacity Issues, 21 (June 2006). <http://www.gao.gov/new.items/d06898t.pdf>

¹⁵⁴ *General Procedures*, Ex Parte 347 (Sub. No. 3).

The *Coal Rate Guidelines* anticipated that SAC cases could be complex and indicated the need to evaluate each issue on a case-by-case basis rather than a simple “one-size-fits-all” approach. The ICC outlined the primary objective of the SAC procedure as follows: “The purpose of a SAC analysis is to determine the least cost at which an efficient competitor could provide the service, because by so doing we are stimulating the competitive price for the market. Hence, although many different SAC calculations could be offered, we will be guided in the individual cases by the least cost (theoretically) feasible SAC model”.¹⁵⁵

As acknowledged by the ICC and later the STB, there are several ways to determine the least cost SAC model. The first and most direct approach would be to define the shortest route that serves the traffic at issue. As shown in in **Figure 4-1** below, this would be the approach as defined by SARR A.

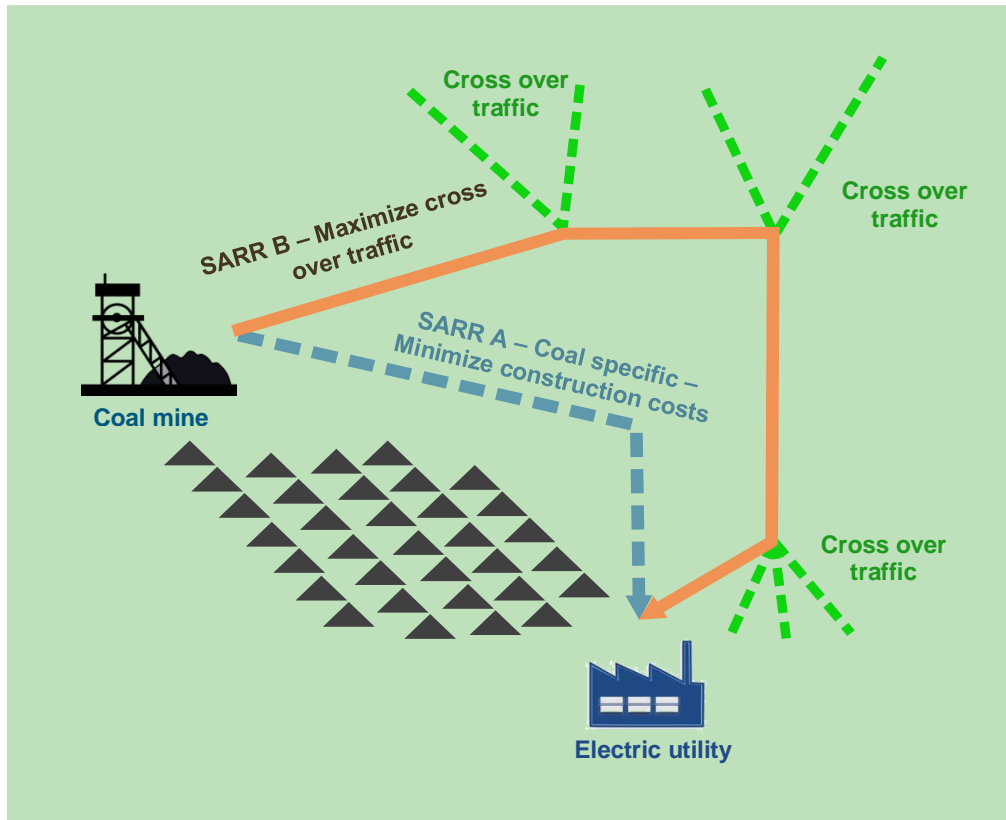
A second approach is to define the SARR that maximize the contribution of the cross-over traffic, shown as SARR B in below.

When presenting a case for rate relief, shippers are permitted to take into account all economies of scale and scope to minimize the cost of the traffic at issue.

This practice has introduced increasing complexity in the SAC procedure.

¹⁵⁵ *Coal Rate Guidelines*, 1 I.C.C.2d at 27.

Figure 4-1: Comparison of Two Hypothetical Stand-Alone Railroad Configurations



Source: Inter VISTAS Consulting Inc.

The lowest-cost SARR may not necessarily be the one that exhibits the lowest construction costs but the one that can benefit from the contribution of cross-over traffic that is large enough to produce the lowest average variable cost of the traffic at issue. In the figure above, the SARR B is defined so that the revenue effect of the economies of scope from the cross-over traffic is maximized.¹⁵⁶

This ambiguity is explicitly noted in the *Coal Rate Guidelines*:

The parties will have broad flexibility to develop the least costly, most efficient plant. The plant should be designed to minimize construction (or acquisition) and operating costs and/or maximize the carriage of profitable traffic. In selecting the route of a SAC railroad, for instance, an overriding factor may be the effort to lower costs by taking advantage of economies of density. Generally, a stand-alone railroad would attempt to fully utilize plant capacity, adding other profitable traffic in order to reduce the average cost of operation. Thus the stand-alone railroad

¹⁵⁶ Roughly speaking (economists have lots of subtleties and qualifications to the concept), economies of scope occur when it is cheaper per unit to produce two different products than to produce one.

may not represent the shortest route for the captive shipper, but the one with the highest traffic densities.¹⁵⁷

By permitting shippers to propose a stand-alone railroad that maximizes the carriage of profitable traffic, the *Coal Rate Guidelines* specifically recognized that shippers should benefit from the revenue effect of the economies of scope enabled by a higher level of output. In practice, economies of scope arise from cost complementarities. Cost complementarities represent a large source of economies of scope in a multiproduct industry.¹⁵⁸ Cost complementarities in the railroad industry refer to the marginal cost reducing effect that may occur when a railroad serves additional traffic,¹⁵⁹ giving rise to economies of scope. The concept is central to the stand-alone cost test in its practical form as the complaining shipper seeks to minimize the rate of the traffic at issue. The shipper may wish to add a very large amount of cross-over traffic to its hypothetical stand-alone railroad to take advantage of large hypothetical economies of scope. *Coal Rate Guidelines* specifically encourages the shipper to benefit from the economies of scope when designing their hypothetical stand-alone railroad. The decision also anticipated that an efficient competitor would seek to maximize economies of scope. It specifically noted that the ICC at the time saw “no need for any restrictions on the traffic that may potentially be included in a stand-alone group.”¹⁶⁰

The benefit of the economies of scope was also supported by an analysis provided by Baumol, Panzar and Willig.¹⁶¹ They described a situation in which a multiproduct firm had a monopoly for one product and operated in a competitive market for another product. Customers of the monopoly market could benefit through lower prices from the participation of the firm in the competitive market because of cost complementarities:

When the monopoly market is not perfectly contestable, regulation may be desirable; but regulatory policy should then be designed, insofar as possible, to replicate the results of a contestable market, thereby encouraging the monopolist's participation in the competitive market as a socially efficient means to take advantage of economies of scope rather than adopting the socially wasteful policy that denies the monopolist that opportunity or impedes its use.¹⁶²

Thus, the theoretical basis of the SAC test supports the maximization of economies of scope. The cost complementarities concept of the cost function ensures that adding cross-over traffic to the SARR would decrease the marginal cost of the traffic at issue. A consequence is that the complexity of the procedure is an inherent component of the Full-SAC cases as developed over the years. As Faulhaber noted: “The

¹⁵⁷ *Coal Rate Guidelines*, 1 I.C.C.2d at 28-29.

¹⁵⁸ Squires, Dale and James Kirkley, *Production Quota in Multiproduct Pacific Fisheries*, 21 J. of Environ. Econ. and Management no. 2 (1991).

¹⁵⁹ Additional traffic on the same line, but not necessarily for the same origin and destination.

¹⁶⁰ *Coal Rate Guidelines*, 1 I.C.C. 2d at 29.

¹⁶¹ Baumol, Panzar and Willig, *Contestable Markets*.

¹⁶² *Ibid.*, 355.

extreme complexity is no accident and should be no surprise; it evolved as part and parcel of the regulatory process.”¹⁶³

The complexity of the procedure is a necessary exercise for those who want to estimate an economically efficient rate for the traffic in a network industry. However, based on review of past Full-SAC cases, some of the complexity can also be attributed to the effort of the shippers to develop increasingly complex SARRs that maximize cross-over traffic and associated economies of scope, even if the traffic is only tangentially related to the SARR.¹⁶⁴ If shippers want a simpler, faster and less expensive procedure, they can use the simplified procedures developed and made more accessible to shippers by the STB. The Three-Benchmark and the Simplified-SAC tests provide the shipper the opportunity to challenge rates they believe are unreasonable at a lower cost. While these procedures may be less comprehensive, they may still provide reasonable and less expensive ways for shippers to seek relief on the rates they challenge. For many cases, there is reason to believe that the simpler procedures will produce similar or nearly identical outcomes as Full SAC. The following sections review these simplified procedures. Section 5 will examine the consequences of replacing Full SAC with the simpler procedures for two past rate cases adjudicated by the STB.

4.2 The Three-Benchmark Procedure

4.2.1 Introduction

After the introduction of the CMP principles and the Full-SAC test and at the direction of the Congress (as part of the ICC Termination Act of 1995), in 1996 the Board issued Simplified Guidelines to determine the reasonableness of challenged rail rates charged on captive traffic where the CMP guidelines could not practicably be applied.¹⁶⁵ These were intended to provide medium and small shippers with access to regulatory relief when they face potential unreasonable rates. The Board’s action recognized that a Full-SAC proceeding could be quite expensive and thus not feasible where the amount of money at issue is not great enough to justify the expense.

STB’s decision in *Rate Guidelines–Non-Coal* introduced the Three-Benchmark Procedure under which three revenue-to-variable-cost measures are used as benchmarks to determine the reasonableness of rates:

- The first benchmark is the Revenue Shortfall Allocation Method (RSAM). The RSAM measures “the uniform markup above variable cost that would be needed from every shipper of potentially captive traffic (the R/VC_{>180} traffic group) in order for the carrier to recover all of its URCS fixed costs.”¹⁶⁶

¹⁶³ Faulhaber, Gerald R, “Verified Statement – Stand-Alone Cost – Response to Comments,” Ex Parte No. 722 (Sub-No. 2) Railroad Revenue Adequacy and Ex Parte No. 664 (Sub-No. 2) Petition of the Western Coal Traffic League to Institute a Rulemaking Proceeding to Abolish the Use of the Multi-Stage Discounted Cash Flow Model in Determining the Railroad Industry’s Cost of Equity Capital, Reply Comments submitted by Concerned Shipper Associations, Exhibit A (filed Nov. 4, 2014).

¹⁶⁴ See *Otter Tail*.

¹⁶⁵ *Simplified Guidelines*, 1 S.T.B. 1004.

¹⁶⁶ *Ibid.*, slip op. at 19, 1 STB at 1027.

- The second benchmark is the Revenue to Variable Cost ratio for Comparable traffic (R/VC_{COMP}), based on movements sharing the same characteristics with the traffic at issue. This measure is the markup paid by comparable traffic and is intended to “provide a means of reflecting demand-based differential pricing principles.”¹⁶⁷ While the STB noted this test is “admittedly crude,” it concluded that this “was the only simple means available to obtain even a rough measure of this very important pricing factor.”¹⁶⁸
- The third benchmark is the Revenue to Variable Costs over 180% ratio ($R/VC_{>180}$). It measures the average markup over variable cost earned from potentially captive shippers by the defendant railroad (or being paid by all potentially captive shippers). This benchmark “measures the degree of differential pricing actually being practiced by that carrier.”¹⁶⁹ The STB computes the RSAM and the $R/VC_{>180}$ every year.

These three measures were defined with the objective of providing small shippers access to the regulatory process without sacrificing much of the theoretical basis of the CMP principles. Each benchmark represents a simplified component of the CMP principles, and the combination of the three can be linked to the theoretical basis of CMP and Ramsey Pricing.

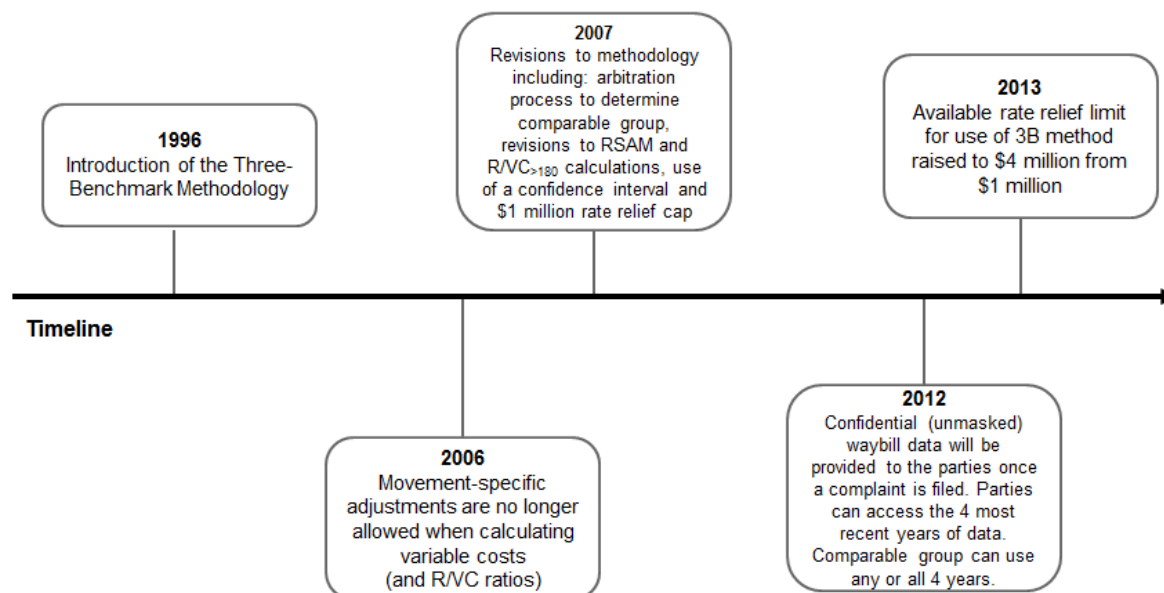
Over time, the STB has offered successive updates to the guidance and application of its Three-Benchmark approach to increase its accuracy and reliability. **Figure 4-2** illustrates the four major changes that STB adopted since the introduction of the Three-Benchmark method in 1996.

¹⁶⁷ Ibid., slip op. at 25, 1 STB at 1034.

¹⁶⁸ Ibid.

¹⁶⁹ Ibid., slip op. at 28, 1 STB at 1038.

Figure 4-2: Major Regulatory Changes to the Three-Benchmark Method



Source: Inter VISTAS summary of information from STB Decisions EP 347 (Sub No. 2), EP 657 (Sub No. 1), EP 646 (Sub No. 1), EP 646 (Sub No. 3), EP 715

The first change occurred in 2006, restraining the ability of shippers and railroads to modify the URCS variable costs in their estimation process.¹⁷⁰ The Board adopted the proposal to no longer allow “movement-specific” adjustment to URCS variable costs. The Board felt that the added costs of these movement-specific adjustments were not justified.

The second change introduced major changes in the comparable group determination, the RSAM and R/VC_{>180} calculations, and the rate relief cap.¹⁷¹ In this 2007 decision, the Board provided for:

- Inclusion of a mandatory mediation period at the beginning of the case.
- Access to unmasked waybill data once a complaint had successfully been filed; the data included is only for the defendant carrier.
- A Final Offer Arbitration (FOA) method to determine the comparable set to use in the Three-Benchmark analysis.
- Revision to the RSAM and R/VC_{>180} ratio calculations, including the removal of the RSAM range, using unadjusted URCS figures to calculate the R/VC_{>180} ratio and adding the carrier’s revenue shortfall/overage to the RSAM formula.
- Comparison group movements will include only defendant traffic.

¹⁷⁰ *Major Issues*, EP. 657 (Sub-no. 1) (STB served Oct. 30, 2006), <http://www.stb.dot.gov/Decisions/readingroom.nsf/WEBUNID/5C7E822CBDC68AD385257217005C5064?OpenDocument>

¹⁷¹ *Simplified Standards*, <http://www.stb.dot.gov/Decisions/readingroom.nsf/WEBUNID/CA4BB78C4CA56E5985257352006BC9DD?OpenDocument>.

- Using a confidence interval to determine rate reasonableness.
- Allowing either party to introduce evidence of other relevant factors (but not movement-specific adjustments to URCS) that could increase or decrease the maximum allowable rate.
- Maximum rate relief is set at \$1 million over a five year period.

The third major revision occurred in 2012.¹⁷² This formalized the process for obtaining the necessary confidential waybill data (i.e., “unmasked” waybill data) for the Three-Benchmark analysis. Once the complaint had been filed, the parties would be allowed access to the four most recent years of data matching the most recent year of the RSAM figure available. The parties could decide which years they chose to include in their comparable groups.

Finally the 2013 revision raised the available rate relief from \$1 million over five years to \$4 million.¹⁷³ The increase in the limit was spurred by the removal of rate relief limits for Simplified-SAC cases and additional information on the cost of litigating the simplified cases. Note that at present, shippers whose revenue at stake exceeds \$4 million would have their potential relief limited if they choose the Three-Benchmark method, but not if they choose either the Simplified-SAC or Full SAC methods.

4.2.2 Three-Benchmark Link to CMP and Ramsey Pricing

The Board recognized that the Three-Benchmark “measures provide an appropriate frame of reference for our rate reasonableness analysis.”¹⁷⁴ When designing the Three-Benchmark procedure, the Board ensured that the underlying concept of CMP and its Ramsey pricing basis were effectively embodied in the three measures. Each of the Three-Benchmark measures reflects a conceptual component of CMP.

RSAM: Revenue Adequacy

As noted above, the Revenue Shortfall Allocation Method (RSAM) benchmark is a measure of “the uniform markup above variable cost that would be needed from every shipper of potentially captive traffic (the >180 traffic group) in order for the carrier to recover all of its URCS fixed costs.”¹⁷⁵ In other words, the RSAM benchmark is intended to approximate what the railroad needs to charge its potential captive shippers to be revenue adequate. This benchmark addresses the revenue adequacy of the carrier, a key component of Ramsey pricing. As well, it embraces the concept of differential pricing, by recognizing that some traffic is very price sensitive (the below 180% R/VC traffic) and that other traffic is able to pay higher mark-ups and may need to pay higher markups in order for the railroad to be revenue adequate.

¹⁷² *Waybill Data Released in Three-Benchmark Rail Rate Proceedings*, Ex Parte No. 646 (Sub-no. 3) (STB served Mar. 12, 2012), <http://www.stb.dot.gov/Decisions/readingroom.nsf/WEBUNID/8A55681AC3A6AB11852579BF004D2B25?OpenDocument>

¹⁷³ *Rate Regulation Reforms*.

¹⁷⁴ *Simplified Guidelines*, slip op. at 14, 1 STB at 1020.

¹⁷⁵ *Ibid.*, slip op. at 19, 1 STB at 1027.

The RSAM benchmark is calculated by adding the carrier’s tax-adjusted revenue shortfall (or subtracting the overage) to the numerator of the R/VC_{>180} benchmark.¹⁷⁶ A carrier’s revenue shortfall reflects the carrier’s inability to generate enough revenue from potentially captive traffic to be revenue adequate. Such shortfall should then be taken into account to ensure that the traffic at issue is not cross-subsidizing other traffic. Hence, by including railroad specific adjustments, the measure effectively takes into account the managerial efficiency (or inefficiency) adjustments as required in the CMP. The RSAM benchmark is computed based on URCS variable costs. Its mathematical formula is the following:¹⁷⁷

$$RSAM = \frac{(REV_{>180} + Adjusted\ REV_{short/overage})}{VC_{>180}}$$

Prior to 2007, RSAM was published using a lower and upper band. The lower band excluded all the <100% traffic (where the carrier priced below the URCS variable cost of the traffic). The upper band included this traffic. “The upper end of the range reflects the average markup above variable cost that the railroad would need if it were to replace all of its assets as they wear out. The lower end subtracts out any shortfall related to movements priced below the 100% R/VC level. The lower end is an attempt to capture managerial inefficiencies.”¹⁷⁸ The Board used the range as it believed that the adjusted RSAM would understate the revenue requirement whereas the unadjusted figure (upper band) would overstate the revenue requirement.¹⁷⁹ The RSAM is no longer reported as a range following the 2007 Simplified Standards.¹⁸⁰

R/VC_{>180}: Differential Pricing Charged to Captive Shippers

The R/VC_{>180} benchmark estimates the average markup the railroads currently charge their potentially captive shippers. Because it takes into account all traffic charged above the 180% threshold, the R/VC_{>180} benchmark measures the “degree of differential pricing actually being practiced by that carrier.”¹⁸¹ The purpose of this measure is to ensure that the complaining shipper is not paying a disproportionate rate for the traffic at issue. It compares the issue traffic with the average R/VC of all other potential captive movements.

This embraces the Ramsey pricing concept of differential pricing, which is required to achieve the highest economic efficiency (or highest economic benefit) from an enterprise that has substantial economies of scale and/or common costs.

¹⁷⁶ See *Simplified Standards for Rail Rate Cases—Taxes in Revenue Shortfall Allocation Method*, Ex Parte No. 646 (Sub-No. 2), slip op. at 2 (STB served May 11, 2009). See also *Simplified Standards for Rail Rate Cases—2013 RSAM And R/VC>180 Calculations*, Ex Parte No. 689 (Sub-No. 6) (STB served Jun. 16, 2015).

¹⁷⁷ The STB adjusted the RSAM formula in 2008 to account for federal and state income taxes. The tax-adjusted shortfall or overage is equal to the $REV_{short/overage} \div (1 - (\text{State Tax Rate} + (1 - \text{State Tax Rate}) \times \text{Federal Tax Rate}))$. *Simplified Standards for Rail Rate Cases—Taxes in Revenue Shortfall Allocation Method*, STB Ex Parte No.646 (Sub-No. 2), slip op. at 5 (STB served Nov. 21, 2008).

¹⁷⁸ *Simplified Standards*, slip op. at 7, n.12 (STB served Jul. 28, 2006), <http://www.stb.dot.gov/Decisions/readingroom.nsf/WEBUNID/40FB81344FF333CA852571B9004C7A82?OpenDocument>

¹⁷⁹ *Simplified Guidelines*, 1 STB at 1028.

¹⁸⁰ *Simplified Standards*, slip op. at 21-22 (STB served Sept. 5, 2007).

¹⁸¹ *Simplified Guidelines*, slip op. at 28, 1 STB at 1038.

The principle of fairness from CMP is taken into account in this measure. The $R/VC_{>180}$ benchmark is calculated based on URCS variable costs. Its basic mathematical formula is the following:

$$R/VC_{>180} = \frac{REV_{>180}}{VC_{>180}}$$

With $REV_{>180}$ = Total revenue earned by the carrier on potentially captive traffic

$VC_{>180}$ = Total Variable costs of the railroad to handle that traffic

Initially, these calculations were adjusted to match the total revenue and cost information reported by the carriers in their annual filings. The STB eventually decided to remove these adjustments because they did not improve the accuracy of the estimate.¹⁸²

R/VC_{COMP}: Differential Pricing Charged to Comparable Traffic

The R/VC_{COMP} benchmark provides an estimate of the average markup of comparable captive movements. Thus, this benchmark measures the demand-based differential pricing of other comparable movements charged by the same railroad.

Ramsey pricing principles would indicate that traffic with identical conditions and a common price elasticity (price sensitivity) would pay similar markups on variable cost.

The Board recognized that comparable traffic, depending on how it is defined, may not have exactly the same demand elasticity, but also noted that this was the only way to obtain an estimate of the differential pricing in the market. The benchmark is calculated as follows:

$$R/VC_{COMP} = \frac{REV_{COMP}}{VC_{COMP}}$$

With REV_{COMP} = Total revenue earned by the carrier on the comparable captive traffic

VC_{COMP} = Total variable costs of the railroad to handle the comparable traffic

The comparable group used to estimate the benchmark should reflect as much as possible the characteristics of the traffic at issue because “markups applied to a similar commodity moving under similar transportation conditions can provide some rough indication of the relative degree of demand elasticity for that type of traffic...”.¹⁸³ For dispersed traffic, it may not be possible for the STB to find comparable movements.

¹⁸² *Simplified Standards*, slip op. at 20 (STB served Sept. 5, 2007).

¹⁸³ *Simplified Guidelines*, 1 S.T.B. at 1035.

4.2.3 Methodology, Procedure and Interpretation of the Three-Benchmark Test

Determining Rate Reasonableness

Determining rate reasonableness begins by examining the ratio of RSAM to $R/VC_{>180}$. This provides an indicator of the railroad's revenue adequacy.

If the RSAM (representing revenue required to achieve revenue adequacy) is greater than the $R/VC_{>180}$ ratio (representing revenue actually being earned), it implies that the carrier is not revenue adequate because what it charges its captive shippers is below what is needed to cover its fixed costs. Conversely, if what the carrier actually collects ($R/VC_{>180}$) is greater than what it needs to recover its total costs (RSAM), then the ratio suggests that the railroad is revenue adequate.

RSAM > $R/VC_{>180}$ then the railroad is under its revenue adequacy target

RSAM < $R/VC_{>180}$ then the railroad is above its revenue adequacy target

As noted in the Simplified Standards, while this relationship has not strictly held true in the past due to allowing adjustments to be made to variable cost estimates, the current disallowance of the adjustment on the $R/VC_{>180}$ ratio and the adjustment to the RSAM computation now ensures that the ratio reflects this relationship.¹⁸⁴

The previous step on the Three-Benchmark method addressed revenue adequacy of the carrier. The next process is to assess whether rates are reasonable. To analyze the reasonableness of the rate at issue, the Three-Benchmark test is based on a combination of the three measures.¹⁸⁵ First, the markup on comparable traffic is used as a starting point for rate reasonableness. This, however, must be adjusted up if the carrier is not revenue adequate, and down if the carrier is more than revenue adequate.

$$\text{Needed Adjustment Factor} = \frac{RSAM}{R/VC_{>180}}$$

The purpose of this ratio is to “adjust the rates in the comparison movements to reflect better the maximum lawful rates the carrier can charge captive traffic.”¹⁸⁶ This factor would then be applied to each of the movements in the comparable set.

The original Simplified Guidelines provided another interpretation of the measure.¹⁸⁷ By simply rearranging the terms of the equation, the measure offers a more direct link to the CMP and the underlying Ramsey Pricing principles:

$$\text{Three Benchmark Measure} = \frac{R/VC_{COMP}}{R/VC_{>180}} \cdot RSAM$$

¹⁸⁴ *Simplified Standards*, slip op. at 19-20 (STB served Sept. 5, 2007).

¹⁸⁵ *Ibid.*

¹⁸⁶ *Ibid.*, slip op. at 81.

¹⁸⁷ *Simplified Guidelines*, 1 STB at 1044.

- The first part of this term is the ratio of R/VC_{COMP} to $R/VC_{>180}$ which reflects the specific relative elasticity of the traffic at issue to the average elasticity of all potentially captive traffic. This ratio was called the “demand adjustment factor for differential pricing.” If the R/VC_{COMP} is greater than the $R/VC_{>180}$, the revenue need (estimated by the RSAM) is adjusted upward to account for the “relatively greater inelasticity” of the traffic reflected in the higher R/VC_{COMP} .¹⁸⁸
- RSAM reflects the average markup needed by the carrier to achieve revenue adequacy.

This presentation demonstrates that the Three-Benchmark test reflects Ramsey Pricing: achieving but not exceeding revenue adequacy and setting differential prices based on the elasticity of demand.

Upper Boundary for Three-Benchmark Test

As noted previously, each movement in the comparison group is adjusted by the RSAM-to- $R/VC_{>180}$ ratio to calculate what economists or statisticians call a “point estimate.” The STB recognizes that there is a range of comparable rates in the comparison group and uses the point estimate to compute an upper boundary for Three-Benchmark test of rate reasonableness. The Board calculates the mean and standard deviation of all adjusted movements in the comparison group to estimate the upper boundary of a reasonable confidence interval around the estimate of the mean.¹⁸⁹

$$\text{Upper Boundary} = R/VC_{COMP} + t_{n-1} \times \frac{S}{\sqrt{(n-1)}}$$

With R/VC_{COMP} = mean of the adjusted comparable movements

S = standard deviation of the adjusted comparable movements

If the challenged rate is above the upper boundary of the reasonable confidence interval, the rate may be considered unreasonable.

Other Factors

The Three-Benchmark methodology is relatively straightforward to compute mathematically, but the STB added some complexity by allowing railroads and shippers to propose increases or decreases in the comparable rates based on “other relevant factors.” However, the STB imposed limits on what can be presented as relevant factors by the parties: “We will not permit any evidence of product and geographic competition as to specific movements or of movement-specific adjustments to URCS.”¹⁹⁰ The STB also retained the right to refuse to consider evidence, even if relevant, that would generate a significant increase of the cost of the simplified approach.

¹⁸⁸ Ibid.

¹⁸⁹ *Simplified Standards*, slip op. at 21-22.

¹⁹⁰ *Simplified Standards*, slip op. at 77-78.

Final Determination

The maximum lawful rate will be fixed at the upper boundary level of the test previously described, taking into account any relevant factors accepted by the Board.¹⁹¹

4.2.4 Challenges Raised With the Three-Benchmark Approach

Both shippers and railroads have raised issues with the Three-Benchmark approach.¹⁹² In particular, the Three-Benchmark approach has been criticized for its lack of theoretical background and the potential for inaccurate estimates. This report has already discussed the conceptual basis for the approach in the context of Ramsey pricing principles. While the Three-Benchmark approach is not supported mathematically by equations similar to Ramsey pricing, the approach does conform to the two key tenets of Constrained Market Pricing: the carrier should have a reasonable opportunity to earn adequate revenues from captive traffic, but no more; and greater economic efficiency is achieved if the carrier uses differential pricing.

Regarding accuracy, the following claims have been offered:

- One of the main criticisms was that the test was too simple to take into account the unique demand characteristics of each movement. Therefore, a rate above a mean of comparable traffic may not necessarily indicate that it is unreasonable but only that it has unique characteristics. The Board replied that the Three-Benchmark procedure is based on adjustments that reflect the different characteristics of the movements at issue and that it embodies a demand-based differential adjustment factor.¹⁹³
- A similar criticism has been raised recently that questioned the applicability of the RSAM and $R/VC_{>180}$ ratio and whether the measures contain any information on the distribution of the rates that are used to compute them.¹⁹⁴
- The Three-Benchmark has also been criticized because it relies entirely on URCS cost estimation. URCS has been previously criticized for the inaccuracy of its estimations for individual movements and for potential incomplete information. In addition, some criticized the use of URCS data that are inevitably somewhat dated and reflect prior market conditions. Thus, the method imposed a “regulatory lag” of one or two years, which might be particularly troublesome in periods of rising rates.¹⁹⁵ The issue with URCS was also highlighted in a 2015 report to the Transportation Research Board. The report argued that rate regulation based on this cost system would be flawed by the inaccuracy of the estimations because “[t]he methods used by STB to

¹⁹¹ Ibid.

¹⁹² For a summary of the issues raised, see *Simplified Standards*, slip op. at 72-84.

¹⁹³ Ibid., 73.

¹⁹⁴ Burton, Mark, *The Economics of Evolving Rail Rate Oversight: Balancing Theory, Practice and Objectives*, 81 J. of Transp. Law, Logistics & Policy no. 4 (2014).

¹⁹⁵ *Simplified Standards*, slip op. at 84-85.

assign variable costs to shipments by allocating portions of a railroad's total expenses are economically invalid and produce unreliable results..."¹⁹⁶

- The Three-Benchmark procedure has also been criticized for potential inadequacy for certain commodities, particularly grain shipments. The Three-Benchmark procedure is designed to protect individual shippers that are being singled out for market abuse. With grain, the "comparable" group is composed of other grain shippers. Yet those shippers argued that railroads have instituted across-the-board high rates, causing all comparison groups to face high rates. As a result, rate relief would be unavailable.¹⁹⁷

4.2.5 Analysis of Criticisms

There is some validity to these criticisms. Indeed, the STB has itself acknowledged shortcomings in URCS, and already has made a number of changes to address concerns that have been raised. Beyond these changes, the STB has identified three possible approaches to further refining URCS: a basic option, a moderate option and a comprehensive option.¹⁹⁸ The comprehensive would include updating and possibly replacing the regression analyses as well as re-examining the engineering studies to get a better understanding of the nature of rail costs today.

There is little doubt that the accuracy of URCS to determine variable cost can be improved, but it is unlikely, based on the nature of rail costs, that URCS can ever be made perfect. In particular, the issue of allocating common and fixed costs will remain problematic. Like in most cases, regulators are unlikely to ever have access to perfect information.

It should be noted however, that the proposed alternative of benchmarking against competitive rates has potential issues as well. The key is to compare the rates in question against rates that not only are competitive rates, but are rates that are truly comparable. There is a need to get the right comparative group with which to benchmark rates. For example, TIH chemicals have higher insurance and risk costs and hence need to generate rates that are higher than if they would be for other chemicals. Comparing a TIH rate to other chemicals with a lower risk profile would not be appropriate. There is also a need to have all the service characteristics comparable (distance, volume, whether or not there are guarantees regarding volume, shipper vs. railroad owned cars, service level, type of line used, time of year, handling characteristics etc.). If the comparison is not done right, it could in effect result in the ratcheting down of rates to some inappropriate "lowest common denominator" simply because someone elsewhere is paying less for a shipment which is not truly comparable. Such an approach could threaten railroad viability.

If every shipment with a low price elasticity of demand were granted rates closer to LRMC on the basis of some other, somewhat comparable, group enjoying lower rates, there would be a shortfall of revenue to cover all the common/fixed costs.

¹⁹⁶ Transportation Research Board, Committee for a Study of Freight Rail Transportation and Regulation, *Special Report 318: Modernizing Freight Rail Regulation* (Washington DC: Transportation Research Board, 2015), 4.

¹⁹⁷ National Grain and Feed Association, Submission to the Surface Transportation Board, STB Docket No. 665 (Sub-No. 1), *Rail Transportation of Grain, Rate Regulation Review*, June 10, 2015.

¹⁹⁸ Surface Transportation Board, *Report to Congress Regarding the Uniform Rail Costing System*, May 27, 2010.

While not perfect, from either the perspective of economic theory or accounting accuracy, URCS does provide a common basis for comparison of rates. Wilson and Bitzan note:

*Currently, URCS represents a practical and transparent attempt to estimate the costs of individual railroad movements. It strikes a compromise between theoretically correct aggregate cost functions and measurement of costs based on individual movement characteristics.*¹⁹⁹

4.3 The Simplified-SAC

A decade after the STB introduced the Three-Benchmark procedure, the Board made available to shippers a second alternative to Full-SAC. This new alternative – known as Simplified-SAC – was intended to provide “medium-sized” shippers with a simplified, more affordable, procedure that gave them better access to the rate relief regulation process.²⁰⁰ The Simplified-SAC retained the advantage of a Full-SAC presentation, but in simplified form: the ability to detect abuses of market power whereby a railroad forces a captive shipper to pay more than is necessary for the carrier involved to earn adequate revenues and thereby forces the captive shipper to cross-subsidize parts of the defendant’s rail network it does not use or benefit from.

The main simplification was that shippers were no longer required to design a hypothetical SARR, which a Full-SAC approach mandated and was a costly part of the SAC methodology. Instead, the Simplified-SAC methodology uses the existing route and infrastructure that serves the traffic at issue. This simplification perhaps was not possible (or at least would have been considered inefficient) in the early post-Staggers period because carriers were still using indirect routings and had excess capacity in their networks. By 2007, however, the railroads’ networks were rationalized to a large extent and much more efficient. Thus in many situations, it no longer may be necessary to design a hypothetical SARR to detect and eliminate inefficiencies in the serving railroad’s investment or operations. In other words, in many cases there would not be a significant enough difference between a newly designed SARR and the existing lines to warrant the time and expense of designing a new hypothetical SARR. Rather, the facilities of the SARR will consist of the existing facilities along the analyzed route, including all track, sidings, and yards.²⁰¹

The simplifications introduced by the Simplified-SAC have been criticized as being a less thorough application of the CMP principles.²⁰² The simplified procedure is basically limited to an inquiry as to whether the captive shipper is being forced to cross-subsidize other portions of the infrastructure, and no longer an inquiry into the additional issue as to whether the network the shipment uses is inefficient. STB expected that that network design restriction (i.e., use the current network) would allow the application of these standards to be simpler and less costly. The STB’s response to these criticisms is that simplifying assumptions always involve a trade-off. Shippers that believe the serving railroad’s infrastructure or operations are inefficient can elect the Full-SAC approach.

¹⁹⁹ Wilson, Wesley W. and John D. Bitzan, “Costing Individual Railroad Movements,” Prepared for the Federal Railroad Administration, Department of Transportation, September 2003, p. 11.

²⁰⁰ *Simplified Standards*, EP 646 (Sub No. 1), slip op. at 5 (STB served Sept. 5, 2007).

²⁰¹ *Ibid.*, 15.

²⁰² *Ibid.*, 55-57.

The original Simplified Standards have not been static. The STB has continued to issue revisions and refinements to the methodology.²⁰³ In 2013, the STB approved major methodological changes including:

- removing the rate relief limits for Simplified-SAC cases and raising the cap to \$4 million in Three-Benchmark cases,
- requiring a full RPI analysis,
- using Average Total Cost as the revenue allocation method for cross-over traffic (Full-SAC and Simplified-SAC), and
- changing the interest rate to the U.S. Prime rate from the previous T-Bill rate (which applies to the Three-Benchmark test, the Simplified-SAC test and the Full-SAC test).

The STB recognized that requiring a full RPI analysis of the route would increase the cost of preparing a Simplified-SAC case. Therefore, the Board proposed to remove the limit on rate relief to compensate for the increased cost of litigating Simplified-SAC cases.²⁰⁴

4.3.1 Link to CMP

Simplified-SAC is based on the same process as the Full-SAC analysis and embodies the same underlying CMP principles. The difference is that in Simplified-SAC, the efficiency of the railroad is assumed, likely resulting in a significant reduction in the cost and time to litigate a case to a final STB decision.

The STB acknowledged that the Simplified-SAC approach is “a less thorough application of CMP [than Full SAC] in that it would not identify inefficiencies in the current rail operation”. This, of necessity, is a compromise in order to lower the cost of litigation and increase the likelihood that a medium-sized shipper might seek the regulatory protection offered by the STB. Simplified SAC still “allows the Board to determine whether a captive shipper is forced to cross-subsidize parts of the defendant’s existing rail network the captive shipper does not use. The Simplified-SAC method assures that a railroad does not earn monopoly profits on its investments.”²⁰⁵

4.3.2 Methodology of the Simplified-SAC Procedure

The Simplified-SAC procedure is similar to Full-SAC, but with simplifying assumptions and standardization of measures to streamline the process and decrease the litigation cost for shippers. As outlined in *Simplified Standards*, they include:

Route: The analysis will examine the predominant route on the issue movements during the prior 12 months for the traffic at issue.

²⁰³ Two cases have been filed under the Simplified-SAC method, but were subsequently settled. See *U.S. Magnesium, L.L.C. v. Union Pacific Railroad Company* (Docket No. 42115) and *U.S. Magnesium, L.L.C. v. Union Pacific Railroad Company* (Docket No. 42116).

²⁰⁴ *Rate Regulation Reforms*, Ex Parte 715 (STB served Jul. 18, 2013).

²⁰⁵ *Rate Regulation Reforms*, slip op. at 9.

Configuration: The facilities of the SARR will consist of the existing facilities along the analyzed route (including all track, siding, and yards). If a shipper presents compelling evidence that some facilities along the route have fallen into disuse by the railroad, and thus need not to be replicated, those facilities will be excluded from the SAC analysis.

Test Year: The Simplified-SAC analysis will examine the reasonableness of the challenged rates based on a 1-year analysis. The Test Year is the most recently completed 4 quarters preceding the filing of the complaint. In contrast, full SAC does the analysis for 10 or more years.

Traffic Group: The traffic group will consist of all movements that traveled over the actual route in the Test Year. No rerouting of traffic will be permitted.

Cross-Over Traffic: The revenues from cross-over traffic will be apportioned between the on-SARR and off-SARR portion of the movement based on the revenue allocation methodology used in Full-SAC proceedings.

The Operating Plan

Unlike the Full-SAC test, Simplified SAC requires that the shipper use URCS to estimate the operating expenses of the SARR. Once again, the purpose of this requirement is to remove cost assumptions and network configuration as contested issues.²⁰⁶

However, URCS is designed to estimate variable costs and not total costs. To estimate the total operating expenses, the STB recognized that some adjustments would need to be made to the URCS data.²⁰⁷ The STB stated that the adjustments included removing costs associated with RPI, removing costs that would be included in the DCF analysis, and removing various other costs that would otherwise be included in a Full-SAC analysis.

While the STB initially considered providing the adjusted URCS data for Simplified-SAC analysis, it ultimately decided that the parties should make the necessary adjustments because doing so would “subject the modifications to the rigorous scrutiny of litigation, where any issues in the implementation of this approach can be fully aired before the Board endorses any particular approach.”²⁰⁸

In 2013, the STB decided in connection with removing the limit on rate relief that Simplified-SAC cases should include a full RPI analysis to reinforce the accuracy of the Simplified-SAC.

The Revenue Requirement Analysis

The revenue requirement analysis is realized using a discounted cash flow model. Unlike the Full-SAC analysis that uses a 10-year cash flow projection period, the Simplified-SAC only requires an analysis based on one year:

²⁰⁶ Ibid., 16.

²⁰⁷ Ibid., 50.

²⁰⁸ Ibid., 51.

Discounted Cash Flow Analysis: The DCF analysis will calculate the capital requirement of a SARR in a customary fashion and then compare the revenues earned by the defendant railroad against the revenue requirements of the SARR only for the Test Year.²⁰⁹

Rate Prescription and Reparations

While the Full-SAC allows a rate prescription for a 10-year period, the Simplified Standards provide a maximum rate prescription only for a 5-year period, which may be more appropriate given that one of the simplifications is to only do calculations for a single, test year, rather than for 10 or more years :

Maximum Reasonable Rate: The SAC costs (i.e., the revenue requirements of the SARR) will be allocated amongst the traffic group based on the methodology used in Full-SAC cases.

5-Year Rate Relief: The maximum lawful rate will be expressed as a ratio of revenue to variable costs, with variable costs calculated using unadjusted URCS. This maximum R/VC ratio would then be prescribed for a maximum 5-year period.²¹⁰

4.3.3 No STB Final Adjudication of a Case with the Simplified-SAC

Notably, to date, there have been no cases that have had a final decision using the Simplified-SAC method. Thus, there are no lessons that can be drawn from its applications. Five cases have been raised for potential Simplified-SAC resolution, but all were settled before the methodology could be tested.²¹¹

4.3.4 Most Full SAC and Simplified-SAC Cases Have Been Brought by Coal Shippers

A large majority of the Full-SAC cases has been filed by large coal shippers. By contrast, shippers that move smaller tonnages over long distances such as grain shippers have not filed any cases, notwithstanding the STB's simplification efforts. Some argue that the high cost of litigation could not be offset by any potential relief they might win. In 2012, agricultural shippers claimed that the Full-SAC approach is not appropriate for their industry. They also claimed that even the Simplified-SAC and the Three-Benchmark rate are too complex and too costly relative to the expected benefits.²¹²

Chapter 5 examines whether the STB's simplified alternatives can produce similar results to the application of Full-SAC. If either the Three-Benchmark or Simplified-SAC method would appear to provide equivalent outcomes to Full-SAC, shippers may be more willing to use these alternatives to Full-SAC. When using the Three-Benchmark method, shippers have access to a relief as high as \$4 million. When using the Simplified SAC, they may win as much relief as they would using Full-SAC. The following chapter examines the consistency of the three procedures based on the analysis of two past cases.

²⁰⁹ Ibid., 16.

²¹⁰ Ibid., 15.

²¹¹ *William Olefins v. GTC* (NOR 42098); *BP Amoco v. NS* (NOR 42093); *Shell Chemical v. NS* (NOR 41670); *U.S. Magnesium v. UP* (NOR 42115); and *U.S. Magnesium v. UP* (NOR 42116).

²¹² "Comments of the U.S. Department of Agriculture," *Rate Regulation Reforms*, Ex Parte 715 (filed Oct. 23, 2012), <http://www.stb.dot.gov/Filings/all.nsf/WEBUNID/AFF36A4882B7329A85257A9F006DF432?OpenDocument>

5 Simplifying the SAC Procedure: Two Cases, Two Procedures

5.1 Introduction

This chapter presents the results of the project team’s examination of two cases that the STB decided based on Full-SAC analyses. The project team’s re-examination sought to determine whether use of either the Three-Benchmark procedure or the Simplified-SAC would yield outcomes that were consistent with the analyses and findings of a Full-SAC test. Two past cases were selected, each with a different outcome concerning rate reasonableness. In *Otter Tail Power Company v. BNSF Railway Company*, NOR 42071, the STB found that Otter Tail failed to demonstrate that the challenged rates were unreasonably high. In *Western Fuels Association, Inc. and Basin Electric Power Cooperative v. BNSF Railway Company*, NOR 42088, the Board determined that the challenged rates were unreasonable. To compare the results of the three methods for these two cases, the Three-Benchmark and Simplified-SAC methods were applied to data from *Otter Tail* and *Western Fuels* with necessary adaptations.

5.1.1 Case Summaries

Otter Tail Power Company v. BNSF Railway Company

Otter Tail Power Company v. BNSF Railway Company, NOR 42071, was originally filed in early 2002 and the STB’s decision was served on January 27, 2006. Otter Tail filed its complaint over BNSF’s common carrier rates for coal movements of approximately 2 million tons annually from mine origins in Wyoming’s Powder River Basin (“PRB”) to the Big Stone Generating Station (“Big Stone”) located in South Dakota. Prior to filing, Otter Tail transported coal from the PRB to Big Stone under confidential contracts with BNSF; the common carrier rates came into effect following failed negotiations between the two parties. Otter Tail sought to demonstrate the unreasonableness of those rates under the STB’s Full-SAC methodology.

Over the course of the four-year proceeding, there were a number of disputes between the two parties in relation to the SAC analysis. A highlight of *Otter Tail* was a contentious dispute over the cross-over traffic that would be included in the traffic group of the SARR.²¹³ The STB ruled that Otter Tail’s SARR incorrectly relied on revenue from cross-over traffic that was utilizing only a small portion of the proposed SARR and was unfairly cross-subsidizing the longer, less densely used portion of the SARR. Therefore, the STB limited the amount of revenue from cross-over traffic that could be used to reduce the revenue requirement of the core facilities on the longer segment. As a result, the STB dismissed the case, finding that BNSF’s rate had not been shown to be unreasonably high.

²¹³ *Otter Tail*, slip op. at 8 (STB served Jan. 27, 2006).

Western Fuels Association, Inc., and Basin Electric Power Cooperative v. BNSF Railway Company

Western Fuels Association, Inc. and Basin Electric Power Cooperative v. BNSF Railway Company, NOR 42088 (hereafter “*Western Fuels*” or “*WFA*”), was originally filed in October 2004, and the Board served its final decision on February 29, 2009. WFA filed its complaint over BNSF’s common carrier rates for transporting coal from mines in the PRB to its Laramie River Station utility plant (approximately 200 miles).²¹⁴ Prior to the common carrier rates coming into effect, the parties had been shipping coal under a 20-year contract, with rates approximately half of the proposed common carrier rates. In its decision, the Board noted that commercially, the common carrier rates were among the lowest for transporting PRB coal over similar and even longer distances. The STB also noted that the common carrier rates were twice the previous contract rates.

The Board issued an initial decision in September 2007, holding that WFA failed to demonstrate that they were paying more than necessary to cover the costs of the infrastructure required for the 200-mile shipment. However, during the course of the litigation, the Board, in *Major Issues in Rail Rate Cases*, EP 657, changed the methodology for allocating revenue from cross-over traffic on the SARR. The Board held that WFA had been unfairly disadvantaged because it had designed its SARR based on the prior method of allocating cross-over traffic revenue and the new method adopted in *Major Issues* would materially change the design of the SARR. Therefore, the STB gave WFA the chance to redesign their SARR to address the new revenue allocation procedure and to submit supplemental evidence based on that redesign. On their second attempt, WFA was successful in showing that they were paying BNSF rates that covered more than the cost of the infrastructure required for their short distance shipments. The ruling resulted in WFA receiving a large rate reduction of the common carrier rates. For 2009, this was an approximately 60% reduction, although the new rates were still roughly 240% of BNSF’s variable costs.²¹⁵

5.2 Adapting the Three-Benchmark Test

The project team adapted and applied the Three-Benchmark method to assess whether the analysis would provide the same outcome as the Full-SAC analysis or a similar outcome for the two test cases. This analysis must be viewed as provisional as it has not undergone the rigorous scrutiny of an actual rate case proceeding before the STB. For example, in an actual Three-Benchmark case, adjustments can be made to the maximum allowable rate (by either the shipper or the carrier) if the party can show the change is required to reflect a relevant factor. We have not applied any such adjustments here. The details of this provisional analysis are discussed below, and conclusions are provided in section 5.3.

5.2.1 R/V/C Ratio of Issue Traffic

The first step in all of the rate relief methodologies is to compute the R/V/C ratio for the issue traffic. This figure is used to determine whether or not the 180% jurisdictional threshold for market dominance has

²¹⁴ The 200 miles is an approximation based on the loaded miles agreed on by the parties. The loaded miles for each of the mines included in the analysis ranged from 140 to 188 miles. *Western Fuels*, Opening Second Supplemental Evidence, 10-11 (filed Feb. 22, 2007), http://www.stb.dot.gov/Filings/all_2000s.nsf/WEBUNID/85257CA7006C955B8525728A0071BC4D?OpenDocument

²¹⁵ NOR 42088, slip op. at 2 (STB served Feb. 18, 2009).

been met. Prior to the methodology change in 2006, the parties would submit their estimates of the issue traffic R/VC ratio, allowing for movement-specific adjustments (namely, substituting actual movements costs for system averages provided by URCS). These movement-specific adjustments are no longer allowed, and the estimates for the R/VC ratio of the issue traffic are calculated using URCS without adjustments.²¹⁶ For the purpose of the analysis, both methods were tested.

Adjusted R/VC (Pre-2006)

The adjusted R/VC ratios were available in the public case filings for the two cases, with the appropriate indexing already completed. As expected, there is a large difference between the R/VC estimates provided by the two parties. On the one hand, shippers tend to use a more aggressive approach to estimate lower variable costs as the resulting higher R/VC ratio of the movement at issue is in their interests; a higher R/VC ratio demonstrates market dominance and implies that a rate may be unreasonable. On the other hand, railroads tend to adopt a more conservative approach leading to lower R/VC ratios as it is in their interest to use adjustments that will show higher costs.

Unadjusted R/VC (Post-2006)

For the Otter Tail case, unadjusted ratios were computed using the STB's Railroad Cost Program based on URCS data for the relevant years of the case and the movement characteristics collected from the various case filings. It was not necessary to index the variable cost estimates as we used the available annual costs data. The unadjusted R/VC ratios were available in the WFA case filing and were already indexed to the appropriate years and quarters.

5.2.2 RSAM and R/VC_{>180}

The first two benchmarks needed to complete the Three-Benchmark analysis are the RSAM and R/VC_{>180} ratios computed annually by the STB.²¹⁷ For comparative purposes, the results of our analysis are based on RSAM markups and R/VC_{>180} ratios calculated using both the pre-2007 and 2007 methodology changes noted in **Section 4**.

RSAM Pre-2007

As noted in Chapter 4, prior to 2007, the STB's RSAM benchmark incorporated a range where the lower estimate included adjustments for the any shortfall but the upper estimate was unadjusted. However, using the range created some uncertainty in specific situations. As noted in *Simplified Guidelines*, if the R/VC_{>180} figure falls within that range, the analysis would be considered inconclusive.²¹⁸

The STB's annual calculation of RSAM and R/VC R/VC_{>180} for Class I rail carriers served April 21, 2003 showed that BNSF's 4-year average RSAM for 1998-2001 was between 213-289, and that BNSF's 4-year average R/VC_{>180} ratio was 265, which are clearly within the 4-year range. These calculations are reproduced in **Table 5-1**.

²¹⁶ *Otter Tail* predates the methodology change in *Major Issues*. Movement-specific adjustments are no longer allowed when computing the R/VC ratios.

²¹⁷ *Rate Guidelines – Non-Coal*, (STB served Apr. 21, 2003 and Jun. 22, 2005) (computing annual RSAM and R/VC_{>180} for Class I rail carriers).

²¹⁸ *Simplified Guidelines*, 1 S.T.B. at 1043.

Table 5-1: RSAM and R/VC_{>180} Example Tables, 1998-2001

Railroad/ Region	4 - Year Average	2001	2000	1999	1998
BNSF	213-289	258-354	222-296	185-248	188-258
GTW	149-205	146-168	129-186	118-188	203-278
IC	200-247	182-233	231-287	228-283	159-184
KCS	269-328	302-364	275-339	280-345	220-264
SOO	337-453	328-441	298-361	399-565	324-445
NS	195-245	186-235	208-272	191-227	
CSX	221-265	242-290	217-259	205-245	
UP	262-379	213-299	254-369	231-322	349-527
Eastern Region	208-254	211-258	213-265	201-240	
Western Region	241-338	233-326	243-341	217-298	270-388
National	222-294	224-298	228-308	213-277	

Railroad / Region	4 - Year Average	2001	2000	1999	1998
BNSF	265	266	266	263	266
GTW	237	236	243	255	213
IC	258	255	241	264	272
KCS	249	263	242	248	243
SOO	245	256	228	246	250
NS	208	219	200	206	
CSX	198	192	191	210	
UP	229	234	222	234	225
Eastern Region	207	208	199	213	
Western Region	246	249	242	247	244
National	232	234	225	237	

Source: *Rate Guidelines – Non Coal Proceedings*, STB Ex Parte No. 347 (Sub-No. 2) (STB served April 21, 2003), 2-3.

RSAM 2007

Beginning in 2007, the Board changed the calculation of the RSAM to address issues in the previous calculation by using confidential waybill data. The STB discontinued using a range for the RSAM markup and provided only one figure.²¹⁹ The new RSAM also takes into account a carrier’s revenue shortfall (or overage) adjustment in the calculation as was previously done in the adjusted RSAM. The project team also tested the Three-Benchmark approach using this calculation, since shippers would have applied this RSAM in a Three-Benchmark case after 2007. STB staff provided the RSAM under the new methodology for the years related to the cases.

5.2.3 R/VC_{Comp} and the Comparison Group

The R/VC_{Comp} ratio benchmark provides an estimate of the average markup of comparable captive movements. To create the set, we examined movements with similar characteristics to the issue movements. This included car type, car ownership, and distance among other factors. The team also made adjustments to remove outliers and traffic that might not be considered comparable (e.g., specifically any movements with R/VC ratios below 180%).

In an actual case, the final comparable traffic group would be decided via a “final offer procedure” whereby the Board decides between the final comparison groups submitted by each party. It is not possible in this provisional analysis to determine exactly which movements would have been chosen by

²¹⁹ The modification is detailed in *Simplified Standards*, EP 646 (Sub No. 1), slip op. at 19-21 (STB served Sept. 5, 2007) and in the Notice of Proposed Rulemaking, *Simplified Standards*, EP 646 (Sub No. 1), slip op. at 21-22 (STB served Jul. 28, 2006).

the Board in the arbitration process. However, it is possible to test different combinations of comparable movements to reflect the conservative approach of a railroad (lower R/VC) or an aggressive approach of shippers (higher R/VC). Variations between the different sets included expanding the allowable distance band, varying the rail car ownership type and limiting the rail car type.

For the *Otter Tail* case, the comparable movements were chosen based on the issue movement characteristics for the two mines analyzed in the Full-SAC analysis.²²⁰ These characteristics included the car type, car ownership and comparable distance band. As the movements to the two mines share similar characteristics, the same set of comparable movements was used for both mines. As noted previously, in an actual Three-Benchmark case, the STB would choose the comparable group through a final offer procedure; in place of that, a total of six comparable groups were tested. The different groups were determined by varying the restrictions on the movement characteristics. For example, expanding the allowable distance band added 500 movements to the base comparable set.

All six comparable sets included a base filter removing movements with R/VC ratios below 180%. In addition, they included specific criteria reflecting different level of restriction:

- The first comparable set included all rail car types used in the issue movements, had no restriction on the number of cars per train, included only privately owned cars, and ran distances between 700 and 1,100 miles. (In subsequent discussions and in the accompanying figures, this set is referred to as “Simulated 3B-1.”)
- The second set added a restriction to include only movements using J311 car types, based on the movement characteristics of the issue traffic. (“Simulated 3B-2.”)
- The third set added a restriction to only include movements with 115-117 cars per train. (“Simulated 3B-3.”)
- The fourth set mimicked the first set, but expanded the distance band to range between 500 and 1,300 miles. (“Simulated 3B-4.”)
- The fifth and sixth sets mimicked the 2nd and 3rd sets, respectively, allowing for the longer distance band between 500 and 1,300 miles.²²¹ (“Simulated 3B-5” and “Simulated 3B-6.”)

For the *WFA* case, the comparable group was also based on the issue movement characteristics. There were five separate mine origin/destination pairs in this case, but all of the mines are located within 50 miles of each other; as well, the car types and movement characteristics are similar for these mines. Accordingly, the project team chose to use one set of comparable movements for all five mines. Similar to the *Otter Tail* analysis, as part of the sensitivity analysis, the team tested different variations of the comparable group, adjusting restrictions on what was considered comparable (i.e., longer distance band, car type, etc.):

²²⁰ While other mines were included under the tariff rate, R/VC ratios calculated by both parties were only available for the two mines.

²²¹ Issue movement characteristics are sourced from NOR. 42071, BNSF Opening Evidence and *Otter Tail* Opening Evidence (both filed June 13, 2003).

- The first comparable set included all potentially comparable movements, filtering for movements with R/VC ratios below 180% and outlier movements.
- The second comparable set also included a restriction to include only movements using J311 car types (based on the movement characteristics of the issue traffic).
- The third set added an additional restriction to only include movements with privately owned rail cars.
- The fourth set included the additional restriction to include movements with distances between 90 and 240 miles (approximately plus/minus 50 miles from the shortest and longest issue movements).
- The fifth set relaxed the ownership restriction, and includes all distances,
- The sixth set included the restricted distance band.²²²

The Three-Benchmark method also allows the parties to submit evidence on potential adjustments to the calculated maximum R/VC ratio; these are referred to as “relevant factors.” The project team’s analysis does not account for such potential adjustments.

5.3 Findings of the Three-Benchmark Adaptation

5.3.1 Otter Tail v. BNSF

Results Based on the Current (2007) Simplified Standards for Three-Benchmark

The Three-Benchmark adaptation computed here tend to provide similar outcomes to the actual Full-SAC case when using the most recent methodology (based on new RSAM calculation and unadjusted R/VC). **Figure 5-1** summarizes the results of the Three-Benchmark approach using the 2007 RSAM calculation for the traffic originating from the Belle Ayr mine.²²³ The bars in varying shades of grey represent the six different comparable data sets calculated by the project team (described above), which vary by type of rail car, car ownership, and distance traveled. The “BNSF adjusted R/VC ratio” was calculated by BNSF for the issue traffic, adjusting for movement specific costs. The “Unadjusted R/VC (URCS)” was computed by the project team using URCS data, averaging the R/VC ratios for 2002 and 2003, calculated using the movement characteristics from the public case filings.²²⁴ The “Otter Tail Adjusted R/VC” is the R/VC for the issue traffic, calculated by Otter Tail, but adjusting for movement specific costs.²²⁵

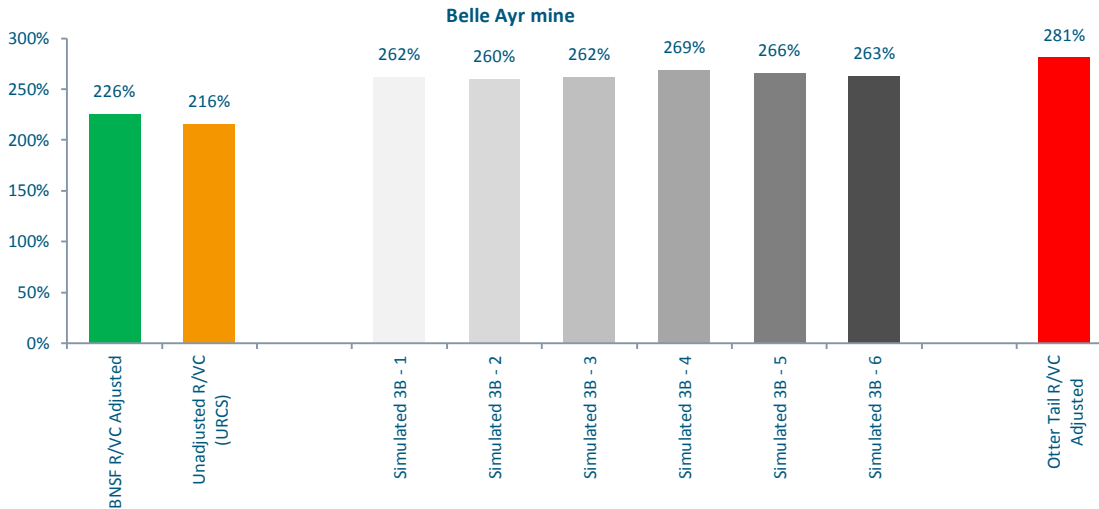
²²² Issue movement characteristics are sourced from STB Docket No. 42088, Western Fuels Association, Opening Second Supplemental Evidence, 10-11 (filed Feb. 22, 2007).

²²³ Results for the traffic originating from Eagle Butte leads to the same results and is presented in Appendix A

²²⁴ Movement inputs are from NOR 42071, BNSF Opening Evidence, II-14-16 (filed Jun. 13, 2003). The calculations are consistent with the current methodology for calculating R/VC ratios (no movement specific adjustments allowed).

²²⁵ This ratio is the average of the first five quarters the issue traffic moved under the contested rates (2002:1 to 2003:1). NOR 42071, Otter Tail Opening Evidence, II-A-41 (filed Jun. 13, 2003). As noted previously, these adjustments are no longer allowed when calculating R/VC ratios.

Figure 5-1: Results of the Three-Benchmark Analysis Using the 2007 RSAM



Source: InterVISTAS analysis of data from public filings.

These results allow for the following observation:

- Based on the Otter Tail adjusted R/VC (281%), the adapted Three-Benchmark approach would suggest that the rates are unreasonable, because the R/VC of the traffic at issue would be higher than the Three-Benchmark test (the 6 grey bars shown in Figure 5-2). However, use of this ratio would not be allowed under the current Three-Benchmark Simplified Standard, which no longer authorizes adjustments beginning in 2007.
- Based on the BNSF’s adjusted R/VC (226%), the adapted Three-Benchmark would suggest that the rates are not unreasonable, because the R/VC of the traffic at issue would be lower than that produced by the Three-Benchmark approach. Here again, the ratio would not be allowed under the new Simplified Standard as adjustments are no longer authorized after 2006.
- Based on the unadjusted R/VC (216%) which calculated from URCS data, the Three-Benchmark test suggests that the challenged rates are not unreasonable. This outcome using the Three-Benchmark test, based on the current 2007 RSAM standards, is consistent with the outcome of the actual STB decision using Full-SAC.

This outcome using the Three-Benchmark test, based on the current 2007 RSAM standards, is consistent with the outcome of the actual STB decisions using Full-SAC

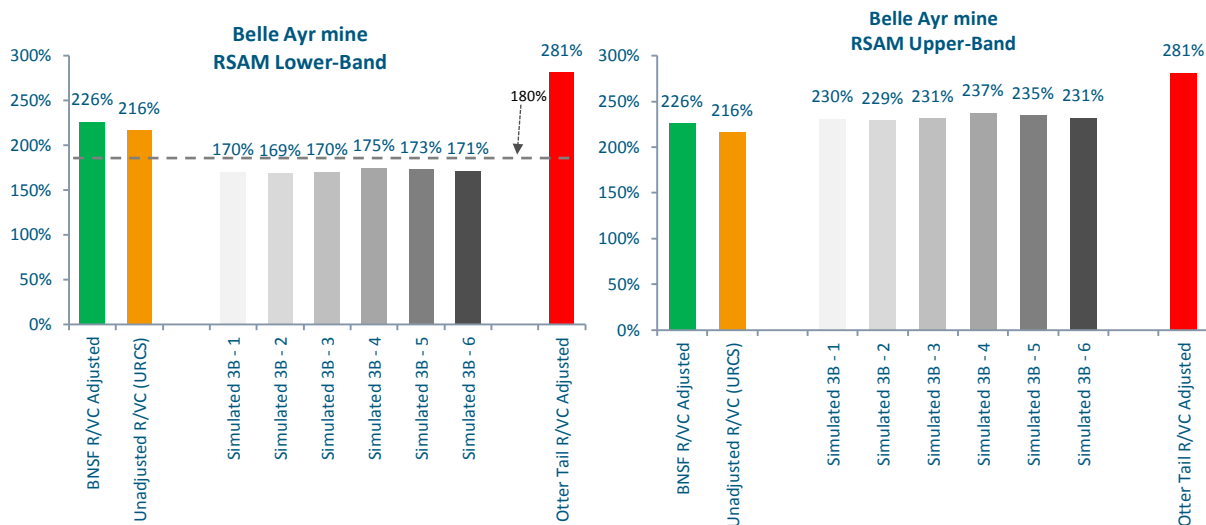
Results Based on the 2002 Simplified Standards for Three-Benchmark

The project team also re-examined what the outcome of the *Otter Tail* case might have been if the parties had used the Three-Benchmark method in effect in 2002 rather than the revised Three-Benchmark method adopted in *Simplified Standards*. At that time, shippers and railroads were authorized to adjust

the R/VC ratio of the traffic at issue. In addition, the RSAM was not a single measure but a range. The lower band of the range was the RSAM measure adjusted for the revenue shortfall of traffic priced below 100% while the upper band was the non-adjusted RSAM. The lower band was considered to understate the revenue requirement to be borne by shippers. The upper band was considered to overstate the revenue requirement to be borne by shippers.

Figure 5-2 illustrates the results of the team’s adapting the Three-Benchmark approach with the pre-2007 RSAM calculations which allow for a lower and upper band. As can be seen in the left-hand graph below, the six calculated R/VC ratios based on the RSAM lower band are below the 180% threshold.²²⁶ The results shown here are for traffic originating at the Belle Ayr mine. Results for the traffic originating from the Eagle Butte are similar and lead to the same conclusion.

Figure 5-2: Results of the Three-Benchmark Approach Using the Pre-2007 RSAM



Source: InterVISTAS analysis of data from public filings.

Under the pre-2007 methodology, BNSF’s adjusted R/VC and the URCS-unadjusted R/VC lie in the RSAM range. In this particular case, it is not possible to reach a conclusion on rate reasonableness because the formula does not tell whether the comparable should be adjusted upward or downward. As the original *Simplified Guidelines* stated, “the formula was never intended to provide a final result, but only a starting point for a more particular analysis.”²²⁷ However, the adjusted R/VC ratios are still higher than the adapted Three-Benchmark upper boundary, suggesting that the rates are unreasonable.

While the pre-2007 methodology would not have provided a clear outcome for the *Otter Tail* case, **the results based on our application of the Three-Benchmark method adopted in *Simplified Standards***

²²⁶ The Three-Benchmark method usually sets the upper boundary for the allowable R/VC ratio. In this case, the lower band leads to allowable R/VC ratio below 180%. As a result, the allowable R/VC ratio would need to be set 180% because the Board cannot prescribe rates below the 180% regulatory floor. See *Excel Energy v. BNSF*, NOR 42057, slip op. at 39 (STB served Jun. 8, 2004).

²²⁷ *Simplified Guidelines*, 1 S.T.B. at 1043.

would have been the same as the STB decision in *Otter Tail*: Both the Full-SAC proceeding and the project team’s re-examination using the adapted Three-Benchmark method did not find that the challenged rates were unreasonably high.

5.3.2 WFA v. BNSF

The project team’s adaptation of the Three-Benchmark approach for *Western Fuels* generally yields conclusions that were similar to those reached using the Full-SAC case when using the most recent methodology (based on new RSAM calculation and unadjusted R/VC). **Table 5-2** presents the results of the project team’s re-estimates of the case applying the Three-Benchmark approach with the 2007 RSAM calculation for the traffic originating from the Belle Ayr mine.²²⁸ The “BNSF adjusted R/VC ratio” was calculated by BNSF for the issue traffic, adjusting for movement specific costs. The “Unadjusted R/VC (URCS)” was available in the public case filings. The “WFA Adjusted R/VC” is the R/VC for the issue traffic, calculated by WFA, but adjusting for movement specific costs.²²⁹

Table 5-2: Summary of Three-Benchmark Method Analysis: 2007 RSAM Methodology

Mine	BNSF R/VC Adjusted	WFA R/VC Adjusted	Unadjusted R/VC (URCS)	Simulated 3B-1	Simulated 3B-2	Simulated 3B-3	Simulated 3B-4	Simulated 3B-5	Simulated 3B-6
Dry Fork	306%	463%	417%	346%	293%	297%	298%	293%	303%
Eagle Butte	299%	448%	412%	346%	293%	297%	298%	293%	303%
Cordero	339%	495%	466%	346%	293%	297%	298%	293%	303%
Caballo Rojo	331%	498%	457%	346%	293%	297%	298%	293%	303%
Jacobs Ranch	353%	504%	484%	346%	293%	297%	298%	293%	303%

Source: InterVISTAS analysis of data from public filings.

These results allow for the following observation:

- Based on the BNSF’s adjusted R/VC, the adapted Three-Benchmark test would suggest that the rates are not unreasonable for 4 mines (shaded cells in Table 5-2). The R/VC of the traffic at issue is lower than the Simulated 3B ratio 1, which represents the least restrictive comparable movements, including all comparable movement above 180%. However, this ratio would not be allowed under the new (2007) Simplified Standard, as adjustments are no longer authorized after 2006.

²²⁸ Results for the traffic originating from Eagle Butte leads to the same results and is presented in Appendix A

²²⁹ NOR 42088, WFA Opening Second Supplemental Evidence, 13 (WFA and Unadjusted R/VC Ratios) (filed Feb. 22, 2007), and BNSF Opening Evidence, I-2 (filed Apr. 19, 2005).

- Based on the WFA’s adjusted R/VC, the adapted Three-Benchmark would suggest that the rates are unreasonable, because the R/VC of the traffic at issue would be higher than the Three-Benchmark test. Again, this ratio would not be allowed under the new Simplified Standard.
- Based on the unadjusted R/VC which is calculated from URCS data, the Three-Benchmark test also suggest that the challenged rates are unreasonable.

Thus, using the current most recent Simplified Standards, the adapted Three-benchmark provides similar results as the actual STB decision using Full-SAC case.

Thus, using the current *Simplified Standards*, the adapted Three-Benchmark provides similar results as the actual STB decision using Full-SAC.

Results Based on the 2002 Simplified Standards

As with *Otter Tail*, the project team re-estimated what might have been the outcome under the RSAM methodology available at the time of the case (i.e., using the RSAM Pre-2007 guidance). **Table 5-3** presents the results of the Three-Benchmark analysis.²³⁰ The results are the same -- the rates are generally found to be unreasonable. In the team’s re-examination, only two movements – the Simulated 3B-1, least restrictive comparable movements for the Dry Fork and Eagle Butte mines -- have different outcomes when compared against the BNSF’s adjusted R/VC. All other estimations are found to be less than the BNSF Adjusted R/VC and Unadjusted R/VC ratios.

Table 5-3: Summary of Three-Benchmark Method Analysis: Pre-2007 RSAM Methodology

Mine	BNSF R/VC Adjusted	WFA R/VC Adjusted	Unadjusted R/VC	Simulated 3B-1	Simulated 3B-2	Simulated 3B-3	Simulated 3B-4	Simulated 3B-5	Simulated 3B-6
Dry Fork	306%	463%	417%	322%	272%	276%	277%	272%	282%
Eagle Butte	299%	448%	412%	322%	272%	276%	277%	272%	282%
Cordero	339%	495%	466%	322%	272%	276%	277%	272%	282%
Caballo Rojo	331%	498%	457%	322%	272%	276%	277%	272%	282%
Jacobs Ranch	353%	504%	484%	322%	272%	276%	277%	272%	282%

Source: InterVISTAS analysis of data from public filings.

5.4 Adaptation of the Simplified-SAC Methodology

As noted, the STB thus far has not issued a final decision in a rate reasonableness case using the Simplified-SAC approach. In each case brought forward under Simplified-SAC to date, the parties

²³⁰ Here, the results are based on the upper band of the RSAM range. We do not present the lower band as the results would lead to the same conclusion.

eventually reached a settlement. In the absence of fully litigated Simplified-SAC cases, the project team applied Simplified-SAC to the extent possible. The team could not replicate a “real” Simplified-SAC case as some of the analysis (e.g., RPI, land valuation) would have required more in-depth analysis. To approximate the outcome of the Simplified-SAC, in this report the study team made estimates and simplifying assumptions as needed. This analysis must thus be viewed as provisional, as it has not undergone the rigorous scrutiny of an actual STB proceeding.

This section presents the results of the adaptation of the Simplified-SAC test on the *WFA* case. An adaptation of the Simplified-SAC on the *Otter Tail* case was not possible because of the lack of available data in the case filings. Sections 5.4.1 to 5.4.4 provide details of the computations. Section 5.4.5 provides the result of the analysis.

5.4.1 Defining the Traffic Group

Once the Board determines that the complainant has proven market dominance, the first step of a Full-SAC or a Simplified-SAC case is to determine the traffic group to be analyzed. In a Full-SAC test, the shipper has the choice of the traffic group and the issue can be subject to extensive litigation. For Simplified-SAC, the traffic group is composed of the traffic at issue plus all traffic actually moving on the issue traffic route. Rerouting traffic is not permissible. Instead of building a hypothetical stand-alone railroad, the simplified-SAC test examines the real operations and services provided by the railroads to judge the reasonableness of the rates.

For its re-examination of these cases under a Simplified-SAC test, the project team sought to determine what the total traffic would have been at the time of the case. Because the team lacked access to the carrier’s data, it estimated this traffic based on the case filings:

- The total quarterly tonnage moved by the SARR was 15.4 million tons in 2004 (Q4).²³¹ This represents an annual tonnage of 61.3 million tons and annual revenues of \$228.8 million.²³²
- The SARR would move 19 million tons of rerouted traffic annually, which would account for 37% of its total revenues.²³³ The revenue of the rerouted traffic was estimated at \$84.6 million per year.
- To estimate the total traffic of the SARR under a Simplified-SAC presentation, the team eliminated the rerouted traffic. Thus, the SARR would move an estimated 42.28 million tons of total traffic, accounting for \$144 million revenues in 2004.
- In the *WFA* case, the traffic at issue was composed of 2.16 million tons of coal (fourth quarter 2004) moving from five mines in the Powder River Basin mines (Eagle Butte, Dry Fork, Caballo

²³¹ *Western Fuels*, slip op. at 33.

²³² To annualize, the traffic was multiplied by the (366/92) ratio as the SARR would have operate 92 days in the 2004 and the 2004 year had 366 days.

²³³ NOR 42088, Third Supplemental Reply Evidence of BNSF Railway Company, III-A-3 (filed Jul. 14, 2008).

Rojo, Cordero, and Jacobs Ranch) to the Laramie River Generating Station.²³⁴ This represents 8.6 million tons and \$57.7 million revenues for 2004.²³⁵

- Finally, the team estimated the contribution of cross-over traffic by subtracting the issue traffic from the total traffic of the Simplified-SAC SARR. The Simplified SARR would have moved an estimated 33.7 million tons of coal, or 80% of the total traffic of the Simplified SARR.

The table below summarizes the tonnage and revenues of the traffic group derived from the Full-SAC case filings.

Table 5-4: Traffic Group Determination

Traffic	Variable	Tonnage	Revenues
Total Full-SAC SARR traffic	Q4 2004 (million)	15.4	\$57.5
	Annualized (million)	61.3	\$228.8
	Average rate (\$ per ton)		\$3.8
Rerouted traffic in the Full-SAC SARR	Annualized (million)	19.0	\$84.7
	Average rate (\$ per ton)		\$4.5
Total Simplified-SAC SARR	Annualized (million)	42.3	\$144.2
	Average rate (\$ per ton)		\$3.4
Issue traffic on the Simplified-SAC SARR	Annualized (million)	8.6	\$57.8
	Average rate (\$ per ton)		\$6.7
Cross-over traffic on the Simplified-SAC SARR	Annualized (million)	33.7	\$86.5
	Average rate (\$ per ton)		\$2.6

Source: InterVISTAS analysis of data from public filings.

5.4.2 Estimation of the Operating Expenses

In a Full-SAC case, the shipper estimates the operating expenses based on its own calculations as the SARR moves on a hypothetical efficient network that may not use the existing tracks of the defendant carrier. In a Simplified-SAC case, the SARR uses the existing tracks of the defendant railroad. The STB determined that the defendant carrier's system-average operating expenses would provide a reasonable basis to estimate the operating expenses of the traffic group. As a result, the shipper would estimate the operating expenses of the SARR using URCS.

²³⁴ NOR 42088, Opening Evidence of BNSF Railway Company, Narrative and Exhibits, Volume I of I, II-5 (filed Apr. 19, 2005).

²³⁵ The traffic at issue comprises movements from different mines (Eagle Butte, Cordero, Caballo Rojo, Jacobs Ranch) with specific rates. We used the rate from the Eagle Butte traffic as it is the higher. Other rates would lead to the same results.

However, URCS data needs to be modified to be used in this context for two main reasons. First, URCS includes both operating expenses and some portions of RPI. To reflect only the operating expenses and to avoid any possible double counting, shippers would need to remove some components of URCS that would be included in the RPI and DCF analyses. Second, URCS data needs to be modified to reflect the total costs of moving the traffic rather than the variable costs. The Board detailed all these requirements in the Simplified Standards.²³⁶ But because the Simplified-SAC has never been used, the modifications were never tested.

For the purposes of the project team’s analyses, STB staff provided URCS phase II data so that the team could apply the needed modifications. Using URCS and the characteristics of the traffic group, the team derived the operating expenses per tons shown below in **Table 5-5**.

Table 5-5: Operating Expenses Estimation Using Modified URCS Data

2004 Average	Dry Fork	Eagle Butte	Cordero	Caballo Rojo	Jacobs Ranch	Cross over traffic
Railroad	BNSF					
Segment type	Originate and Terminate					
Distance (miles) (incl. loop track)	186	187.6	153.8	159.9	140.4	209.5
Car type	Plain gondolas					
Number of cars per train	136					
Car ownership	Western Fuels					
Commodity	Coal					
Tons per car	121.5	120.4	121.1	121.1	121	120
Shipment size	Unit Train					
Tons per car	121.5	120.4	121.1	121.1	121	120
Total cost per ton using modified URCS data 2004	\$1.6	\$1.7	\$1.4	\$1.5	\$1.3	\$1.8
Total annual tons in 2004 (million)	\$8.58			\$33.7		
Total estimated operating expenses (with modified URCS) (million)	\$14.2	\$14.3	\$12.2	\$12.5	\$11.3	\$61.7

Source: InterVISTAS analysis of data from public filings and using URCS Phase II Modified Data

The total amount was subsequently broken down by categories of operating expenses using the percentage breakdowns from the Full-SAC cases.

5.4.3 Estimation of the Road Property Investment (RPI)

The Simplified-SAC test now requires that the shippers perform a full RPI analysis. However, the project team did not perform such an exercise for this analysis, because of the lack of access to confidential data. As an alternative, the team attempted to estimate the RPI of the Simplified-SAC based on past cases. In the *Xcel* case, the STB developed a regression analysis based on the relationship between the

²³⁶ *Simplified Standards*, EP 646 (Sub No. 1), slip op. at Appendix B (STB served Sept. 4, 2007).

road property investment and the tonnage and distance variable.²³⁷ While the STB recognized the limits of that method's accuracy based on the number of available observations, it is the only method available to estimate the RPI of the Simplified-SAC in this current analysis. The project team applied the same methodology to eight cases decided before 2006 (including the *WFA Full-SAC* examples).²³⁸

Based on the simple regression of the relationship between RPI and tonnage and distance, the following parameters were estimated:

$$\text{Road Property Investment} = (\$1.75 \text{ million} \times \text{Route miles}) + (\$6.61 \times \text{Tons})^{239}$$

By applying these parameters to the data available in the *WFA* case filings; the team estimated the total RPI of the Simplified-SAC test as \$373,906,000 using Eagle Butte as point of origin. This value does not account for the land value. Adding the land value increased the total RPI to \$378,575,000. **Table 5.6** presents the results after dividing the RPI by categories.

²³⁷ *Xcel Energy v. BNSF*, NOR 42057, slip op. at 31 (STB served Jun. 8, 2004).

²³⁸ The team eventually excluded the following cases:

- *AEPCO v. BNSF* (2005): No RPI analysis available; the STB did not complete the SAC analysis due to inadequate evidence.
- *PPL v. BNSF* (2002): The RPI analysis focused on an issue of cross-subsidies and the cost of a line expansion.
- *FMC v. UP* (2000): This case involved minerals rather than coal and thus was not directly comparable.
- *McCarty Farms v. BNSF* (1997): This case involved grain rather than coal and thus was not directly comparable.

²³⁹ The t-statistics for the mileage and tonnage parameters are 5.02 and 2.01, respectively. The estimated parameters are statistically significant at the 5% and 10% level.

Table 5-6: Estimated Value of the Simplified-SAC RPI Category using Eagle Butte Point of Origin

Categories used the in DCF analysis	Value of the S-SAC based on regression to be used in the DCF
Engineering	\$29,902,000
Land	\$4,695,000
Grading	\$89,331,000
Tunnels	\$14,060,000
Bridges & Culverts	\$30,351,000
Ties	\$25,500,000
Rail and OTM	\$49,456,000
Ballast	\$30,071,000
Track Labor	\$46,157,000
Fences and Roadway Signs	\$5,005,000
Roadway Equipment	\$2,205,000
Roadway buildings	\$3,208,000
Fuel Stations	\$7,066,000
Shops and Enginehouses	\$4,025,000
Communication Systems	\$6,077,000
Signals & Interlockers	\$24,207,000
Public Improvements	\$7,259,600
TOTAL	\$378,575,000

Note: * The Land value was estimated using a simple scale ratio based on the mileage.

Source: InterVISTAS analysis based on data from public filings and STB.

5.4.4 Discounted Cash Flow Analysis

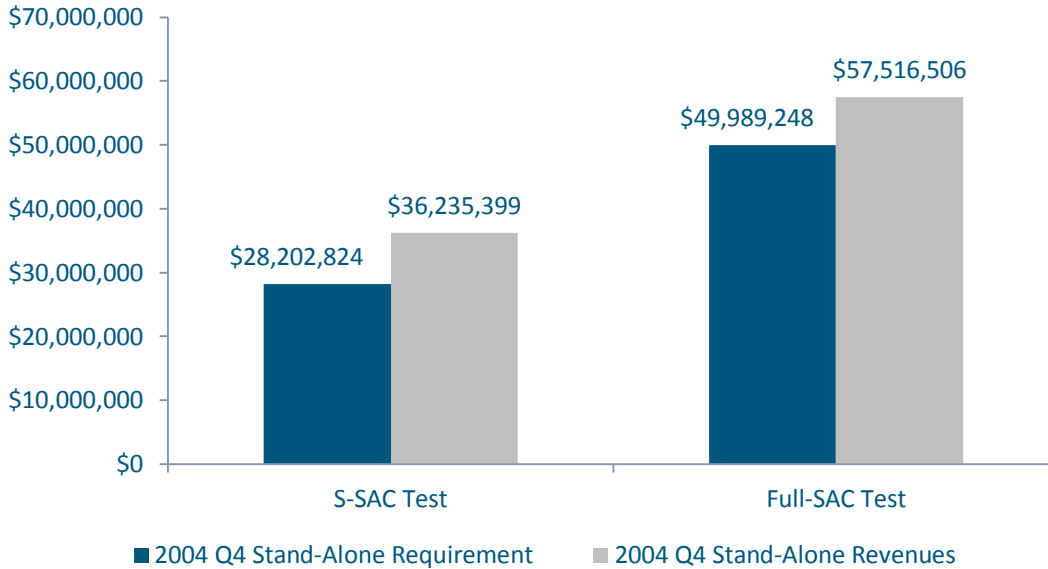
The Discounted Cash Flow (DCF) analysis was performed using the operating expenses and road property investment presented above. For the purpose of the analysis, the team selected a single origin point (Eagle Butte) and estimated what would have been the outcome of the Simplified-SAC test. The DCF calculations were based on the DCF model used in the Full-SAC test. This allowed the project team to replicate the exact parameters used at the time of the case (inflation, traffic projection, cost of capital, depreciation schedule, etc.).

5.4.5 Results

Figure 5-3 summarizes the results of the team’s application of the Simplified-SAC compared against the results produced in the Full-SAC test. While the magnitudes are different because of different cross-over traffic in Simplified-SAC vs. Full SAC, the results are consistent. As with the full SAC, the estimated Simplified-SAC results indicate that the shipper would pay more than is necessary to cover the Simplified

SARR’s stand-alone costs. The Stand-Alone Revenues (\$36.2 million) are higher than the Stand-Alone Costs (\$28.2 million).

Figure 5-3: Results of the DCF Analysis Using Eagle Butte as Point of Origin



Source: Inter VISTAS analysis based on data from public filings and STB.

Both tests show that the shipper is overpaying for the traffic at issue. In this particular case, the estimated overpayment is higher when using the Simplified-SAC case (\$8 million) than in the Full-SAC case (\$7.5 million). Interestingly, under the Simplified-SAC scenario, WFA would benefit from all of the Powder River Basin crossover traffic but would not have to build some of the infrastructure farther down the line such as the interchange yard in Northport that was built in the Full-SAC test. Although the team’s estimations are based on certain assumptions and projections rather than actual data, the results suggest that WFA could have reached the same outcome using Simplified-SAC rather than Full-SAC.

While the magnitudes differ because of different cross-over traffic in Simplified-SAC vs. Full SAC, the results are consistent.

As with the Full SAC, the estimated Simplified-SAC results indicate that the shipper would pay more than what is necessary to cover the Simplified SARR’s stand-alone costs.

5.5 Conclusions

The comparative analysis of the Full-SAC test with the Simplified SAC and Three-Benchmark methods suggests that for these two cases (*Otter Tail* and *WFA*) all three methods would likely have led to similar outcomes for both cases.

- For *WFA*, both the Three-Benchmark and the Simplified-SAC found that the rate would have been unreasonable, the same conclusion reached by the STB in its full SAC proceeding.
- For *Otter Tail*, the Three-Benchmark procedure found that the rates were not unreasonable, the same as the STB determined with the full SAC methodology. The Simplified-SAC was not tested for *Otter Tail* as it would have required confidential data that was not available.

The project team recognizes that results from the comparison of the Simplified Standards to the Full-SAC in only two cases is perhaps not sufficient to draw a general conclusion on the overall convergence of the procedures. However, it provides a signal on the potential of the Simplified Standards to deliver similar outcomes as a Full-SAC.

This key finding is perhaps not surprising, as all three methods derive from the core economic principles of the STB's Constrained Market Pricing.

It should also be noted that roughly thirty years after development of Full-SAC, many of the complexities of the earlier era have evolved. Network rationalization may have reduced the importance of allowing hypothetical routings of traffic for the Stand Alone Railroad as many of the indirect actual routings of the past era are now more efficient. Railroads have continuously increased the efficiency of their infrastructure and it may be more appropriate today to rely on existing efficient traffic routings rather than on a complex hypothetical railroad. Thus the restriction on the traffic group definition in Simplified-SAC, which limits the traffic to the existing route and does not allow rerouting of cross over traffic now may be an effective way to further simplify a Full-SAC case. Findings of convergence of all SAC procedures to similar outcomes would encourage small or medium shippers to use the Simplified Standards. Since the STB removed the limits on rate relief in Simplified SAC cases, large shippers have the choice between Simplified-SAC and a costly Full-SAC case. The latter may still be warranted when the subtle issues in the specific case can affect the final determination. It is noted that the conclusions here are provisional and based on only two cases. To have assurance of the convergence of the SAC procedure, it may be useful to compare the Simplified Standards to other Full-SAC cases and identify whether they are applicable in various situations.

6 Alternatives to Maximum Rate Regulation: Are There Lessons from Other Countries?

The U.S. Congress created a system of maximum rate regulation to protect captive shippers from excessive exercise of market power by market-dominant railroads.²⁴⁰ This has been implemented by the STB through its CMP regulatory framework to assess rate reasonableness, specifically the maximum reasonable rate.²⁴¹

The previous two sections of this report discussed issues associated with the implementation of CMP by the STB, specifically the use of Full-SAC, Simplified-SAC, and the Three-Benchmark methodology. This section examines whether there are relevant lessons from how other countries constrain excessive exercise of market power by rail carriers. It also looks at methodologies used by regulators in other utility sectors, including one concept that has been proposed but is not yet extensively implemented.

6.1 Constraining Rail Rates in Canada

Maximum Rate Regulation until 1987. Until 1987, Canada had a provision for maximum rate regulation of railway services. However; over the decades, this provision was only used once by a shipper, and the regulator never made a ruling in the case.

Final Offer Arbitration (FOA). The National Transportation Act of 1987 replaced the maximum rate regulation provision with a regulatory system that relies primarily on commercial negotiation of contracts between carriers and shippers to constrain rates backstopped by commercial arbitration of railway rates.²⁴² A shipper that is dissatisfied with a rate charged by a carrier may apply to the Agency (currently the Canada Transportation Agency) to designate a third-party commercial arbitrator to choose the final rate/service offer of either the carrier or the shipper. The arbitrator can choose one offer or the other but cannot create any other rate (such as splitting the difference). Decisions made by the arbitrator are not

²⁴⁰ We use the term “excessive exercise of market power” as some use of pricing power will be required for a railroad to cover its fixed costs (unless government is willing to provide subsidy for the fixed costs, as is done frequently in Europe).

²⁴¹ The statute uses the term “reasonable,” 49 U.S.C. § 10701(a). The statute refers to the STB prescribing a ‘maximum reasonable’ rate, and prohibits the railroad from charging the shipper any rate higher than the prescribed rate. 49 U.S.C. § 10704(a)(1).

²⁴² Originally, certain shippers were excluded from access to the FOA remedy for rail shippers, primarily for shippers of certain grains in Western Canada which were covered by provisions of the *Western Grain Transportation Act* (WGTA). In 1996, these shippers received access to FOA when the WGTA was repealed and replaced with a volume-related revenue cap on payments to railways for shipments of these grains. The Act requires the arbitrator to assess whether the shipper in arbitration has “alternative, effective, adequate and competitive means of transport goods, implying that where markets work, they should be left to work.” Transport Canada, *Vision and Balance: Report of the Canadian Transportation Act Review Panel* (2001), 71, <http://publications.gc.ca/site/eng/9.648223/publication.html>. We note that there is some ambiguity here, as it is the arbitrator, not the Agency, who is to determine whether there is an effective alternative means of transport, yet the arbitrator is to choose one of the offers. Presumably this means that in such a case the arbitrator would choose the carrier’s offer, but as there are no reasons given by the arbitrator for her/his decision, this is not clear.

made public, and reasons are not given by the arbitrator to either the parties (carrier and shipper) or to the government.

Rates established by an FOA are set for one year, after which the carrier may establish a different rate, which in turn could be subject to FOA. Repeated FOAs are not unknown in Canada rail transport.

It is our opinion that the non-transparent final offer arbitration process used in Canada to constrain undue exercise of any market power by railways provides no guidance for alternatives to SAC. It may be that the methodologies put forward by one party or the other in the arbitrations could provide insight, but as the process is confidential, no guidance can be provided.

Interswitching. Canada does have an access provision which is reviewed here. In 1904, the Canadian Parliament established an interswitching regime, which required the originating carrier for a specific shipper to pick up and switch a shipment to another carrier's line if the switching distance was four miles (6.4 kilometers) or less.²⁴³ (A similar provision applies for the terminating carrier.) This distance is referred to as Zone 1 interswitching. In 1987 the interswitching limit was increased to 18.6 miles (30 kilometers) by provision for Zones 2-4 interswitching.²⁴⁴ More recently, a 5th interswitching zone was created,²⁴⁵ but is set to expire in August 2016.²⁴⁶ Zone 5 was created to deal with some challenges affecting the transportation of certain western grains when there was a combination of an all-time record grain crop and an arctic vortex that had the effect of reducing system capacity in west.

It is our opinion that the non-transparent final offer arbitration process used in Canada to constrain undue exercise of any market power by railways provides no guidance for alternatives to SAC. It may be that the methodologies put forward by one party or the other in the arbitrations could provide insight, but as the process is confidential, no guidance can be provided.

The Canada Transportation Agency annually establishes rates for interswitching services. The current methodology is based on a systemwide average variable cost per ton-mile,²⁴⁷ with a 20% mark-up. Some important points can be made:

²⁴³ The distance is measured along the line of the originating or terminating carrier to an interchange point.

²⁴⁴ The *National Transportation Act*, 1987, s. 152 (2) established the 30 kilometer distance. S. 152 (4) of the Act gave the Agency the authority to set rates within this limit that varies by distance zone. The Agency established four zones in s. 7 (2) of the *Railway Interswitching Regulations*, SOR/88-41, 17 December 1987.

²⁴⁵ *Fair Rail for Grain Farmers Act* was granted Royal Assent on May 29, 2014. Zone 5 is defined only for the Provinces of Alberta, Saskatchewan and Manitoba, and covers shipping distances from 30 to 160 kilometers (18.6 to 99.4 miles).

²⁴⁶ The federal government elected in October 2015 indicated that it would seek to postpone the expiration of the extended interswitching provisions. (Government of Canada News Release, "Government of Canada intends to work with Parliament to extend certain provisions for rail in the Canada Transportation Act, April 22, 2016.)

²⁴⁷ In Canada, per tonne kilometer.

- The distances for which the interswitching rate are short (only up to 18.6 miles except for the temporary provision for Zone 5) and thus errors in establishing this rate will be proportionately smaller than for the distance of an entire shipment being evaluated in the U.S. using SAC.
- The Canada Transportation Act Review Panel described the interswitching provisions as “an anomaly” and recommended against any extension of interswitching provisions. “In the Panel’s view, extending the interswitching limits would worsen the market distorting aspects of the interswitching rate regime and would be a step backward.”²⁴⁸

This methodology is a distance-based rate. It perhaps should not be described as a fully allocated cost methodology since the rate is not compensatory in that the mark-up is insufficient to cover the average ratio of fixed to variable costs of the Class I Railways.

Given that the STB rejected use of distance-based fully allocated cost as a basis for maximum rate regulation, it is our opinion that the Canadian methodology used to establish short distance interswitching rates provides no insight for the STB on potential revision to or replacement of SAC.

Given that the STB rejected use of distance-based fully allocated cost as a basis for maximum rate regulation, it is our opinion that the Canadian methodology used to establish short distance interswitching rates provides no insight for the STB on potential revision to or replacement of SAC.

Also note that the interswitching “rate” is not a rate paid by a shipper to a carrier. It is an access fee, paid by one carrier to another, for services over a very short distance and a short portion of almost all origin-destination traffic.

Competitive Line Rates (CLRs). One other provision that Canada put in place in 1986 was to allow a shipper to seek a CLR. The distance over which interswitching access to another carrier is available to a shipper is short. CLRs allow a shipper served directly by only one carrier and located outside the interswitching zones, to obtain a regulated rate on the originating carrier over a longer distance from origin to the closest interchange point with another railway (which would complete the origin-destination movement).²⁴⁹ To be eligible for a CLR rate determination by the Agency, the shipper must first have a service and rate agreement with the connecting carrier that will complete the movement. Very few CLR cases have been heard by the Agency.

²⁴⁸ Transport Canada, *Vision and Balance*, 63.

²⁴⁹ There are some restrictions on access to CLRs. They are not applicable to containers, trailer-on-flatcar, and less-than-carload traffic unless originating/terminating with a maritime carrier. They can only be used when the originating carrier haul is less than half the total distance and is less than 1,200 kilometers (746 miles). The shipper using a CLR is not eligible for FOA.

The methodology for establishing the CLR rate is not cost-based, but rather based on the originating carrier's system average revenue per ton-mile for similar traffic.²⁵⁰ The rate must cover variable costs, but there is no requirement that the rate makes an adequate contribution to the carrier's fixed cost. This is especially problematic if the carrier is earning an inadequate return on invested capital, as the CLR will then merely embed non-compensatory rate (in a total cost sense) onto additional traffic. CLRs are effective for only one year.

It is our opinion that the Canadian methodology for establishing a Competitive Line Rate for a portion of a shipper's movement provides no insight for the STB on potential revision to or replacement of SAC. It is a methodology based on system average revenues, not costs, and will embed revenue inadequacy, and conversely could embed above normal returns for a carrier.

Efficient Component Pricing Rule and Access Fees.

Broadly speaking, the Efficient Component Pricing Rule (ECPR) is a form of an access regime in which a new entrant pays the incumbent only for access to those components of the incumbent's network needed to establish service. The challenge of pricing access to those components is to set the price at a point that encourages and enables competition while not unfairly penalizing the incumbent financially. (The next chapter discusses ECPR in more detail as it has been applied to the U.S. telecommunications industry.)

Neither Canadian legislation nor the Canada Transportation Agency has used ECPR, but the 2001 Canada Transportation Act Review Panel did consider it. The Panel recognized ECPR as a methodology to set an access fee paid by one carrier to another and not a rate paid by a shipper to a carrier. Nevertheless it recognized the potential use of ECPR methodology, should Canada adopt a more extensive access regime. As well, while not a specific recommendation, the Panel did indicate that stand-alone cost is a possible maximum rate regulation methodology.

The Panel stated "... competitive access must retain elements of differential pricing while permitting additional competition. Although it could be complex, the Panel sees no alternative to requiring a commodity- or traffic-based access charge, where the access fee bears some relation to the existing revenue contribution of the traffic that is subject to competitive entry. This would approach the ECPR

It is our opinion that the Canadian methodology for establishing a Competitive Line Rate for a portion of a shipper's movement provides no insight for the STB on potential revision to or replacement of SAC. It is a methodology based on system average revenues, not costs, and will embed revenue inadequacy, and conversely could embed above normal returns for a carrier.

The Canada Transportation Act Review Panel, while not a specific recommendation, did indicate that stand-alone cost is a possible maximum rate regulation methodology.

²⁵⁰ The formula uses the interswitching rate for the first 30 kilometers and then uses the average revenue per ton-mile for the remaining distance.

rule but need not conform exactly.”²⁵¹ The panel then goes on to point out that the ECPR rate may be too high as it does not consider whether the carrier is as efficient as possible. Note that the consideration of efficiency is an important element of CMP and of SAC in particular. Interestingly, the Panel concludes by stating: “The Agency could also make use of the stand-alone cost test to deal with the issue of excessive mark-ups.”

6.2 The UK – Access Charges for Freight

In contrast to the structure of the industry in the U.S. and Canada where carriers are vertically integrated (i.e., they build and maintain their own track and operate trains on those tracks), the situation in the United Kingdom, and to a lesser extent Australia, is quite different. In both of those countries, the industry is characterized by vertically separated track and train operations.

In the UK, there is a nationalized track company, Network Rail,²⁵² and a number of competing “above-the-rail” operators (i.e., train operators such as Great Western, Virgin Trains, London Midland, First ScotRail, etc.). Rail regulation is the responsibility of the Office of Rail and Road (ORR), formerly the Office of Rail Regulation.²⁵³ Network Rail is the owner, operator and infrastructure manager of Britain’s main railway network. It runs, maintains and develops the core physical infrastructure of the network and has to ensure efficient management of the assets over the short, medium and long-term. Network Rail retains responsibility for the ownership and stewardship of its network. It is accountable to its customers and funded through a combination of access revenue paid by the train operating companies and government grants. It operates under license to the U.K. government, and is accountable to the ORR, Parliament, and the Secretary of State for Transport.²⁵⁴ The ORR conducts a review of Network Rail every five years to determine the level of government subsidy for the following five years. In 2013-2014, Network Rail incurred costs of £6.2 billion (about US\$9.4 billion), of which £3.7 billion (US\$5.6 billion) came from government and the remaining £2.4 billion (US\$3.7 billion) from operator access charges.²⁵⁵

The above the rail train operators seeking access to Network Rail track ‘windows’ to run freight trains must apply to the ORR for a track access agreement. These agreements cover multiple issues, including standards of performance, operation and maintenance of trains, liability, track charges, and other fees. The complexity of these agreements leads to lengthy contracts, such as the redacted agreement between

²⁵¹ Transport Canada, *Vision and Balance*, 84.

²⁵² When British Rail was broken up into dozens of separate companies, the track was embodied in a private sector, for-profit company called Railtrack. This company experienced major financial difficulty and was eventually re-nationalized as Network Rail. The latter is heavily subsidized by the U.K. government and to some extent by local governments.

²⁵³ The ORR was renamed on 1 April 2015, absorbing both the responsibilities of the former Office of Rail Regulation (established on 5 July 2004 by the Railways and Transport Safety Act 2003) and responsibility for monitoring highways. The ORR replaced the earlier Rail Regulator.

²⁵⁴ The United Kingdom reclassified Network Rail as an “arm’s-length central government body” in 2014. As such, it retains the commercial and operational freedom to manage Britain’s railway infrastructure, but within government regulatory and control frameworks.

²⁵⁵ The remainder came from income from property, retail operations at stations, freight, and other customers. It should be noted that government also provides a small subsidy to the train operators as well. These amounts assume an exchange rate of 1.51 U.S. dollars per U.K. pound, as of December 6, 2015.

the Chiltern Railway Company and Network Rail,²⁵⁶ dated February 5, 2004, which is 395 pages in length and has subsequently been amended by 112 Supplemental Agreements.

ORR Determination of the Revenue Requirement. The ORR methodology first focuses largely on determining:

- A gross revenue requirement for Network Rail, based on its costs;
- The amount to be contributed by government to the gross revenue requirement;
- The residual, which is the revenue Network Rail may generate from access charges; and
- The gross revenue requirement is forward looking, typically estimated based on expected costs for the coming five years.

Note that there is similarity with several SAC principles: a revenue requirement based on costs and costs estimated on a forward-looking basis.

Network Rail Access Charges for Freight Train Operators. For freight access charges, Network Rail has some freedom to set charges on individual operators, but within a framework approved by ORR. Some key aspects of the framework are:

- Freight access charges must cover variable costs imposed on the system by a freight operation;
- For freight operators, some contribution above variable cost is expected;
- That contribution is demand-based and differential. Some operators will make smaller contributions than others. A specific principle is that rates for a particular operator must not be so high that the traffic moves off the system. (But traffic that cannot cover variable costs is not expected to be retained); and
- There is no expectation that revenues collected by Network Rail will cover its total costs.

The ORR and Network Rail use a complex two-part tariff for access charges. The above-the-rail freight operator pays Network Rail:²⁵⁷

- A fixed track access charge for each train slot used to run a train; and
- A variable access charge that depends on weight and distance (charge is effectively per revenue ton-mile) and where the rate varies by commodity type.²⁵⁸

²⁵⁶ Chiltern Railways is owned by Arriva UK trains, which owns another seven above-the-rail-operators. Each is required to have its own access agreement with ORR.

²⁵⁷ This description generally characterizes the Network Rail charges. There are special charges for use of electricity (to distinguish from diesel-electric motive power), where the above the rail operator provides the fuel/energy, some premiums for peak time slots, special charges for locomotive gross ton miles, etc.

²⁵⁸ The complete list of Network Rail charges can be found at:

<http://www.networkrail.co.uk/using-our-network/cp5-access-charges/>

Thus, the UK uses a form of demand-based differential pricing for access by the above the rail operators. This is a form of Ramsey pricing.²⁵⁹

ORR use of SAC. It is worth noting that in its early years, ORR *did* develop stand-alone cost measures with the intent of judging track access charges against stand-alone cost. SAC was viewed as a maximum rate level, above which any price of track access would be judged to be unreasonable. While the ORR measured SAC, it was never actually used for a regulatory determination. The SAC was found to be much higher than the rates being charged by Network Rail's predecessor, Railtrack. Hence, there was no need to use these rates as a maximum rate benchmark against Railtrack.

Assessment. Our view is that the UK approach to determining access charges is of limited relevance to the U.S. It is for a regime where there is a nationalized track operator which is heavily subsidized. There is no regulation of rates paid by the shipper to the freight carrier, only regulation of access charges. Stand-alone cost was once used to assess maximum track access rates, but found irrelevant as SAC rates were well above the subsidized rates. There is no revenue adequacy requirement. However; the regulator guides rail rates based on Ramsey pricing principles, albeit with a large subsidy. Demand- based differential prices are set with different commodities paying different rates. Access rates are two- part tariffs with one rate for access to network 'window' or slot, and a second rate paid based on gross ton-miles.

The UK approach is overly prescriptive, involves a high degree of government oversight and management, does not seek to cover the full costs of the infrastructure, and relies heavily on government subsidy to make the track operator whole.

Note that the UK is currently considering a major reform of Network Rail. The Shaw Report, released in November 2015, is considering what could be another major change in the structure of the UK rail

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Stand-alone cost was once used to assess maximum track access rates, but found irrelevant as SAC rates were well above the subsidized rates.

There is no revenue adequacy requirement.

Access rates are two-part tariffs with one rate for access to network 'window' or slot, and a second rate paid based on gross ton-miles.

²⁵⁹ While Ramsey pricing is often characterized as setting economic welfare maximizing prices subject to a breakeven constraint, the methodology is also applicable for any revenue target. ORR sets a locked-in revenue target for Network Rail by forward estimating its total costs and then determining an amount of subsidy, with the remainder to be recovered from traffic.

industry, including the option of returning to the regime first put in place for Railtrack.²⁶⁰ The potential regime would no longer subsidize Network Rail. Instead, above-the-rail train operators will be subsidized to enable a major increase in access charges to allow Network Rail to become revenue-adequate (self-sufficient). Details are lacking at this point, as the review is still underway as this report is written. In any event, this is merely a possibility and not current UK policy.

6.3 Australia – Access Charges

The Regime. Australia, like the U.S. and Canada, has a rail industry largely focused on freight transport. In terms of industry structure, Australia's rail system is similar to that found in the UK. The majority of the interstate rail network is owned or leased by the vertically separated Australian Rail Track Corporation (ARTC), whose shares are owned by the Australian government. State owned railways or private above-the-rail train operators lease train windows on ARTC to operate trains. Access charges of ARTC can be regulated by the Australia Competition and Consumer Commission (ACCC) upon "declaration" of a specific rail service by the minister responsible for Transport.²⁶¹

The Australian situation, however, is complicated by the fact that in addition to the federal access regime with vertical separation of track from train operations, there are separate access regimes operated by each Australian state for access to publicly owned, vertically integrated intra-state rail lines. State regulators are responsible for regulation of access fees paid by above-the-rail operators in such situations.

ARTC. Like Network Rail in the U.K., the ARTC sells access to its network to above-the-rail train operators. Operators are assessed a two-part access charge. The first part is a fixed charge that gives operators access to the network. The second part is a variable charge that is based on a distance-weight measure (thousand gross ton-miles operated). The pricing principle is that charges (sum of a fixed access charge and variable charges) should not be above the efficient total cost of providing the service, including a normal rate of return on efficient investment. This becomes a stand-alone, maximum-rate threshold when a single shipper is involved in a dispute. The use of a two-part tariff also allows the track owner to better achieve economic efficiency than would be possible under a fully allocated cost approach. The fixed network access component contributes to fixed costs of the network, potentially allowing a lower variable charge, closer to the incremental costs associated with the operation of one additional train. There are operational advantages to the two-part tariff as well: Because the fixed charge per train operated is relatively large, operators are incentivized to

Like the U.S. and Canada, Australia's rail industry is focused on freight transport.

However, like the U.K. it has vertically separated the interstate track network into a federally owned track company.

Vertically integrated state railways must provide access to their track.

²⁶⁰ One of the motivations for a major change is that Network Rail has recently been classified as a government corporation, meaning its debt is now part of the U.K. national debt. Re-privatization would remove Network Rail debt from the government tally.

²⁶¹ Currently the transport portfolio is the responsibility of the Minister of Infrastructure and Regional Development.

operate fewer, but longer, trains. This results in more efficient use of track than running numerous shorter trains, and incentivizes the track provider to ensure the infrastructure can accommodate long trains.

Although ARTC operates on a commercial basis, Australia's rail infrastructure is subsidized. For the year ended 30 June 2015, direct government grants to ARTC amounted to about 6% of total revenues for the year. In addition, federal and state governments frequently make investments in rail infrastructure that flow through ARTC. Between 2013-14 and 2018-19 the Australian government budgeted almost AUS\$2.2 billion (about US\$1.6 billion) for rail infrastructure²⁶² projects.²⁶³

While ARTC is subsidized, its rates are set with an expectation of reasonable profits on its investments.

Like the U.S. and Canada, regulation is applied only in cases of a specific dispute. It is not an all-encompassing regulation of all the charges to all shippers served by ARTC. A complaining above-the-rail operator must first obtain 'designation' from the Minister, after which the ACCC will investigate and regulate. A rate dispute can involve a single above-the-rail transportation service or it may involve several. For example, there is a current regulatory undertaking involving track access charges for track used by most of the coal mines in the Hunter Valley in New South Wales.²⁶⁴

The maximum-rate concept is a stand-alone cost concept:

*"...Access revenue from any Access Holders or group of Access Holders must not exceed the Economic Cost of those Segments, on a stand-alone basis..."*²⁶⁵

The ACCC regulates via an arbitration process, with the goal being the execution of an undertaking between the ARTC, the above the rail operator(s) and the ACCC. Undertakings typically have a five-year life and are renewable upon review. The governing legislation posits that access charges should cover the efficient costs of providing the track services, including a return on investment; allow multipart tariffs (a fixed access plus a rate per ton-mile); and allow differential pricing when it aids economic efficiency.²⁶⁶ As an example of the allowed differential pricing, in the Hunter Valley decision prices would be adjusted for

²⁶² The list of rail investments can be found at:

http://investment.infrastructure.gov.au/publications/policies/pdf/Infrastructure_Omnibus_May2015.pdf

²⁶³ These amounts assume an exchange rate of 1.36 Australian dollars per U.S. dollar, as of December 6, 2015.

²⁶⁴ See Australian Rail Track Corp., 2016 Hunter Valley Coal Network Access Undertaking, Application filed with Australian Competition & Consumer Comm'n, Dec. 23, 2015, <https://www.accc.gov.au/regulated-infrastructure/rail/hunter-valley-access-undertaking-2016/undertaking-application>.

²⁶⁵ Australian Rail Track Corp. "Hunter Valley Coal Network Access Undertaking 2014 Compliance Assessment Submission To Australian Competition & Consumer Commission by ARTC", April 2015, Public Version, 22, <https://www.accc.gov.au/regulated-infrastructure/rail/annual-compliance-assessment-2014/compliance-submission>.

²⁶⁶ Australian Competition and Consumer Commission, "Decision In Relation to Australian Rail Track Corporation's Hunter Valley Rail Network Undertaking" June 29, 2011, <https://www.accc.gov.au/regulated-infrastructure/rail/hunter-valley-access-undertaking-2011>.

coal exporters using the line, but other (especially non-coal) customers would not have their pricing change. The non-coal prices were generally below cost recovery levels due to market conditions.²⁶⁷

A review of the *Hunter Valley Undertaking* indicates that the process took a little over two years to reach a final decision by the ACCC. This does not count the time prior to the initial application where the parties negotiated the draft undertaking. Like SAC, there is a long list of issues to be addressed from defining the network and the level of investment required, determining efficient train configuration, attribution of revenues from non-coal shippers not involved in the undertaking, etc. There are 12 major headings for issues to be addressed, with the list of “other issues” comprising 88 individual assessments/decisions.

Access to track of vertically integrated state railways. For above-the-rail operations on the track of the vertically integrated State-regulated railway companies, regulation of access charges paid by competing above the rail operators is generally composed of:

- A pricing floor that is based on incremental costs;
- A pricing ceiling that is based on the full economic cost of providing access including a return on capital; and
- Market-based negotiations, which take place within this wide floor-ceiling band.²⁶⁸

The band set by the floor and ceiling may be quite broad, allowing considerable room for negotiations. The infrastructure provider has scope to utilize differential pricing and seek prices based on shippers’ willingness or ability to pay. Rates for bulk commodities (coal and ores) are generally closer to ceiling prices, although the Australia Productivity Commission notes that there can be constraint from “sea transport” (meaning source of supply competition).²⁶⁹ The Commission notes that there are differences in access rate regulations between the individual states and that such inconsistency can have negative consequences for economic efficiency. The Commission recommends flexibility between using depreciated historical costs and replacement costs. The main reason is that if there are major cost reducing technologies in development, use of the latter might lead to stranded assets and disincentives to invest. The Commission noted that this has been a problem in the telecommunications sector. Price discrimination is used in the federal and state regimes as a means to improve revenue adequacy so that fixed costs are covered in the face of some rail shippers being price sensitive due to competitive alternatives from road (i.e. trucking).

Comments on access regimes and revenue adequacy. It is worthwhile noting a comment made by the Australian Productivity Commission regarding rail access pricing and its consequences.²⁷⁰ The Commission cautions that access regimes could undermine economic efficiency and revenue adequacy. It is supportive of differential pricing of track access.

²⁶⁷ See Australia Rail Track Corp, “ARTC Application – HVAU – Rate of Return Proposal (Public Version),” filed 23 June 2011, <https://www.accc.gov.au/regulated-infrastructure/rail/hunter-valley-access-undertaking-2011/undertaking-application> .

²⁶⁸ Bureau of Transport and Regional Economics (BTRE), *Rail Infrastructure Pricing: Principles and Practice*, Report 109 (Canberra ACT: BTRE, 2003), 134.

²⁶⁹ *Ibid.*, 135.

²⁷⁰ The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians.

Vertical separation and access regulation, designed to encourage above-rail competition, can constrain scope for efficient price discrimination across users and impede efficient investment, potentially reducing the long-run viability of some lines. While COAG's decision to promote national consistency and coordination in rail access regimes is a welcome advance, the Commission considers that there is scope to wind back access regulation where vertically separated below-rail operators face strong competition from road (or, indeed, sea) freight. Nor should efficient price discrimination by below-rail operators be discouraged. Given the mixed success of vertical separation in encouraging above-rail competition, there should be an independent examination of whether allowing vertical reintegration of those rail lines or networks which face strong intermodal competition would promote their commercial viability.²⁷¹

The Commission went on to comment about the desirability of Ramsey pricing principles:

Prices set to recover each mode's total costs, reflecting Ramsey pricing principles to the extent possible, have the potential to promote efficient use of road and rail freight infrastructure, as well as meeting a self-financing requirement. More specifically, while users should be required to cover at least the attributable costs of their infrastructure use, their contribution to (unattributable) fixed or common costs should be inversely related to the price responsiveness of their demand for the services provided, so as to minimize efficiency losses from discouraged consumption.²⁷²

Assessment. Australia uses an access regime for rail rates. For interstate services, there is vertical separation into a subsidized federal government-owned track company and competing independent above-the-rail train operators. There is no regulation of rates paid by shippers, but there is provision to regulate track access charges paid by the train operator to the track company. Maximum rate regulation is guided by stand-alone cost principles for a single shipper or a group of shippers. The regulation process is multiyear and involves a myriad of steps and decisions. Retrospective caution has been offered about access regimes potentially undermining revenue adequacy and investment.

It is our assessment that, if anything, the Australian experience reinforces some of the key economic principles underlying the STB's CMP, while providing no insight for simplification of the SAC methodology.

Note that, like the U.K., the Australian government has announced it will be conducting a policy review of ARTC, possibly including its privatization. At the time this report was written, the review was underway, and no new policy has been announced.

It is our assessment that the Australian experience reinforces some of the key economic principles underlying the STB's CMP, while providing no insight for simplification of the SAC methodology.

²⁷¹ Productivity Commission, *Road and Rail Freight Infrastructure Pricing*, Inquiry Overview No. 41, 22 December 2006, xlvii, <http://www.pc.gov.au/inquiries/completed/freight/report>. COAG refers to the Council of Australian Governments.

²⁷² *Ibid.*, 60.

7 Maximum Rate Methodologies from Other Regulated Industries

Having considered how other nations limit rail freight rates, the report now turns to regulatory approaches used in other sectors.

7.1 Rate-Base Rate-of-Return and Price Cap Regulation Are Not Appropriate for U.S. Rail Transport

Comprehensive rate regulation approaches, such as rate-base rate-of-return (RBROR) or price cap, are widely used in a number of utility sectors. These approaches regulate *all* rates paid by all customers of a utility directly (for RBROR) or indirectly (for Price Cap). However, these approaches would not be consistent with current U.S. rail legislation which regulates by exception, relying as much as possible on market forces and commercial negotiation to establish freight rates.

This report instead focuses on methodologies used to determine a maximum rate threshold applicable to a single customer upon complaint. Two potential approaches were identified. The first is a regulatory approach sometimes used in the U.S. for telecommunications -- Total Element Long Run Incremental Cost (TELRIC). The second approach considered is one that has been suggested for use in other sectors as well as for rail: the Efficient Component Pricing Rule (ECPR).

Both TELRIC and ECPR are maximum rates methodologies for network industries, but they are methodologies for limiting charges for access to the network. Neither is designed as a methodology for limiting rates paid by end customers (the shipper in the railroad industry) to the service provider (the railroad). Nevertheless, some have proposed use of one or the other of these methodologies as an alternative for limiting rail rates.²⁷³ Nevertheless, ECPR, at least, has been touted as an alternative for limiting rail rates. We consider in this chapter whether the underlying regulatory pricing principles could be applied to rail rates paid by shippers as a simpler alternative to CMP.

7.2 Structural (Access) vs. Conduct (Rates) Regulation

When there is unreasonable exercise of market power, two forms of regulation are available: structural regulation and conduct regulation.²⁷⁴

- **Structural Regulation – Access.** Essentially, structural regulation seeks to address the market power problem by creating or preserving competition. Competition can be preserved by regulating mergers and acquisitions. New competition can be encouraged by breaking up large corporations

²⁷³ See, for example, Baumol, William J. and J. Gregory Sidak, *The Pricing of Inputs Sold to Competitors*, 11 Yale J. on Regulation 171(1994); Kahn, Alfred E. and William E. Taylor, *Pricing of Inputs Sold to Competitors: A Comment*, 11 Yale J. of Regulation 225 (1994).

²⁷⁴ Valletti, Tommaso M. and Antonio Estache, "The Theory of Access Pricing: An Overview for Infrastructure Regulators," *World Bank Policy Research Working Papers* 2133, (1999), <http://elibrary.worldbank.org/doi/abs/10.1596/1813-9450-2097>.

into smaller ones, removing barriers to entry through government-mandated access or other means (e.g., by providing access to a bottleneck resource), by limiting entry into different lines of business (e.g., preventing rail track owners from operating trains as is the case in the U.K., Australia, and some other jurisdictions), etc.

- **Conduct regulation.** Conduct regulation principally involves pricing levels and pricing structure. The regulator accepts that there is limited competition for a particular service and sets rates, or establishes maximum rates that can be charged by a carrier.

The STB's CMP, including SAC, is a form of conduct regulation. It establishes maximum rates that a carrier can charge an end user (a shipper) when the carrier is found to have market dominance. By contrast, rail regulators in the U.K. and Australia do not regulate rates paid by shippers. Instead they use structural regulation by providing access to track to competing above-the-rail train operators. In some U.S. utility sectors, especially telecommunications, structural regulation is used, including provisions to grant access to new competitors to an incumbent's network.

While structural regulation removes the need to regulate prices paid by end users (shippers), there is still a need to regulate the access price paid by a competing carrier for access to an incumbent's network. Thus, structural regulation involving government-mandated or voluntary access imposes two regulatory tasks on the regulator: (a) establish regulations and processes for granting access, and (b) establishing a regulated access price.

The balance of this chapter looks at the latter: what methodologies a regulator can use to set access prices. The chapter examines the approaches used by the Federal Energy Regulatory Commission to set rates for regulated electric transmission and natural gas transportation and offers opinions about the suitability of these approaches to freight rail. The chapter also examines access regulation as implemented by the Federal Communications Commission under the Telecommunications Act of 1996, including the "TELRIC" access-costing methodology used to establish access rates and discusses an alternative access pricing methodology known as ECPR – proposed by some for use in the US railroad sector.

7.3 Overview of Federal Regulation of Electricity Transmission and Gas Pipeline Transportation Rates and Service

The Congress determined that federal regulation of interstate electric energy transmission and its sale at wholesale is necessary in the public interest in the Federal Power Act (FPA).²⁷⁵ The Federal Energy Regulatory Commission (FERC or the Commission) is the independent federal agency that has exclusive jurisdiction to regulate the "transmission of electric energy in interstate commerce," the "sale of electric energy at wholesale in interstate commerce," and "all facilities for such transmission or sale of electric energy."²⁷⁶ Sales "at wholesale" historically were understood to be sales of electricity between electric utilities across state lines, which the Supreme Court had held in 1927 were not subject to regulation by

²⁷⁵ *Federal Power Act of 1935*, § 201(a), 16 U.S.C. § 824(a).

²⁷⁶ 16 U.S.C. §824(b)(1). FERC was established in 1977 in the Department of Energy Organization Act (91 Stat. 565; 42 U.S. §7101). The predecessor regulator was the Federal Power Commission, which had originally been established in 1920 to coordinate hydroelectric projects under federal control.

the states as a direct burden on interstate commerce prohibited by the “Commerce Clause” of the U.S. Constitution and could only be regulated by “the exercise of the power vested in Congress.”²⁷⁷

FERC’s authority to regulate interstate electricity transmission and jurisdictional “sales at wholesale” is derived primarily from Sections 205 and 206 of the FPA.²⁷⁸

- Section 205 provides that all rates and charges for the interstate transmission of electric energy and for jurisdictional sales must be “just and reasonable” and that “any such rate or charge that is not just and reasonable is hereby declared to be unlawful.” Further, “[n]o public utility shall, with respect to any transmission or sale . . . subject any person to any undue prejudice or disadvantage.”²⁷⁹ Further, Section 205 requires regulated companies to establish their rates, terms and conditions for jurisdictional services in public tariffs. Regulated electric utilities must file with the Commission to increase their rates or change other terms and conditions of service; the Commission may order a hearing to determine whether the changes are just and reasonable, suspend the changes for nine months, and permit them to go into effect subject to refund and the outcome of the hearing.²⁸⁰
- Section 206 permits FERC to make changes to existing utility rates, terms and conditions, including transmission charges, either on its own initiative or upon complaint. In order to make such changes, FERC must (1) find that the existing rates or practices are unjust, unreasonable, unduly discriminatory, or preferential; and (2) show that its proposed changes are just and reasonable.²⁸¹

FERC’s authority to regulate interstate natural gas pipeline transportation rates and services stems from the Natural Gas Act of 1938 (NGA).²⁸² Federal regulation was deemed necessary due to concern over the structure of the natural gas pipeline industry and its monopolistic tendencies to charge higher than competitive prices due to market power.²⁸³ Similar to sections 205 and 206 of the Federal Power Act, sections 4 and 5 of the Natural Gas Act gave the Commission the authority to regulate the rates, terms and conditions of interstate “sales for resale” of natural gas and the transportation of natural gas in interstate commerce under the “just and reasonable” standard.²⁸⁴ Unlike the Federal Power Act, Congress also gave the Commission broad authority in section 7 of the NGA to approve the commencement and termination of service contracts and the construction and abandonment of pipeline facilities.²⁸⁵

Federal regulation under the NGA did not extend to the intrastate market. Unregulated intrastate markets developed in Texas, Louisiana, Oklahoma and other gas producing states, especially after the Supreme Court, in 1954, extended federal regulation to the wellhead by holding that gas sales by producers to

²⁷⁷ *Pub. Util. Comm’n of R.I. v. Attleboro Steam Generating Co.*, 283 U.S. 83, 89-90 (1927).

²⁷⁸ 16 U.S.C. §§ 824d, 824e

²⁷⁹ 16 U.S.C. § 824d(a),(b).

²⁸⁰ 16 U.S.C. § 824d(c)-(e).

²⁸¹ *See, for example, Atlantic City Electric Co. v. FERC*, 295 F.3d 1, 9 (D.C. Cir. 2002).

²⁸² *Natural Gas Act*, 15 U.S.C. § 717 et seq.

²⁸³ *See* “The History of Regulation,” September 20, 2013, <http://naturalgas.org/regulation/history/>

²⁸⁴ 15 U.S.C. §§ 717c, 717d.

²⁸⁵ 15 U.S.C. § 717f.

pipelines in the interstate market were subject to cost-based NGA regulation.²⁸⁶ The low wellhead prices imposed by the FPC were a substantial factor in creating the shortages of natural gas in interstate markets in the 1970s, which led Congress to relax and eventually remove wellhead price controls in the Natural Gas Policy Act of 1978.²⁸⁷

FERC recognizes that its mandate to regulate the transmission of natural gas must be balanced with the interests of the industry.

*This [consumer protection] mission must be undertaken by balancing the interests of the investors in the pipeline, to be compensated for the risks they have assumed, and the interests of consumers, and in the light of current economic, regulatory, and market realities.*²⁸⁸

7.3.1 Structure of the Electricity Market and Changes over Time

The electric power system consists of generating units where primary energy is converted into electric power, transmission and distribution networks that transport this power, and industrial, commercial and residential consumers' equipment (also called "loads") where power is used. **Figure 7-1** illustrates the basic structure of the electric grid. Electric power generation in the U.S. is dominated by the use of coal and natural gas. Other sources include nuclear power, hydropower, solar power, and other renewables.²⁸⁹ Generally, electricity must be used as soon as it is produced because electricity cannot be easily stored.

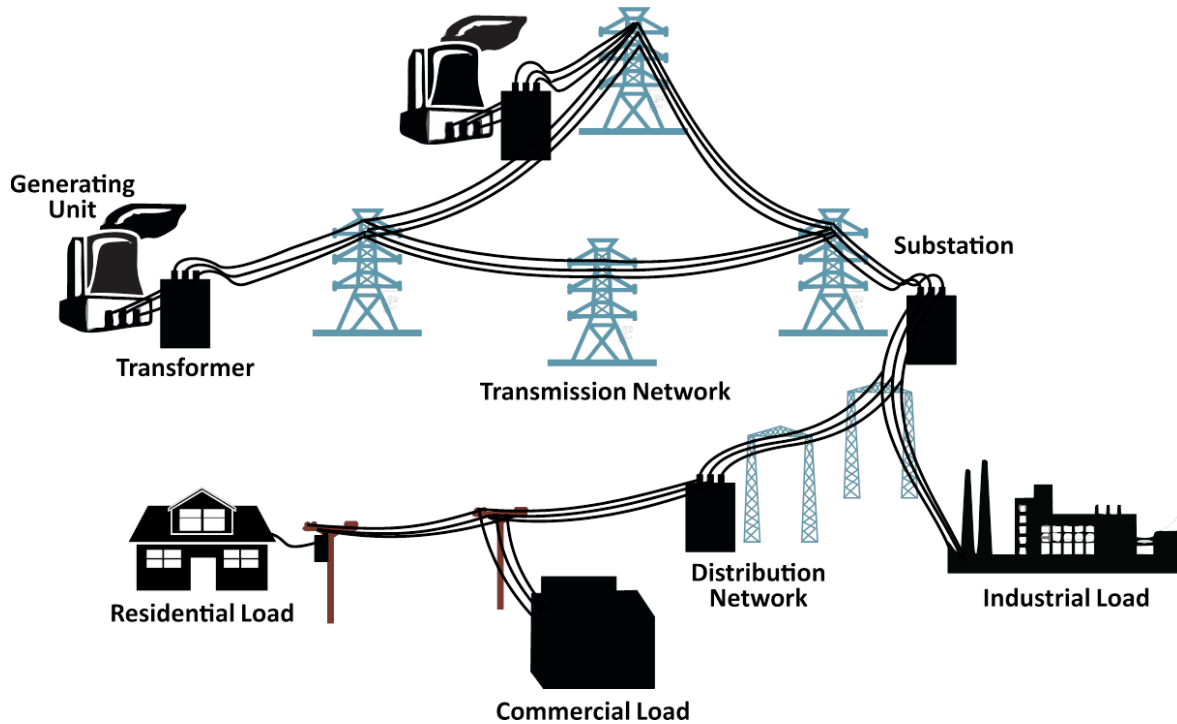
²⁸⁶ *Phillips Petroleum Co. v. Wisconsin*, 347 U.S. 672 (1954).

²⁸⁷ See Joskow, Paul L., "Natural Gas: From Shortages to Abundance in the U.S." 2-4 (Dec. 31, 2012): <http://economics.mit.edu/files/8618>.

²⁸⁸ Federal Energy Regulatory Commission, Final Rule, "Restructuring of Pipeline Services," *Order No. 636* (April 8, 1992), <http://www.ferc.gov/legal/maj-ord-reg/land-docs/restruct.asp>.

²⁸⁹ See U.S. Energy Information Agency, <http://www.eia.gov/electricity/data.cfm#generation>.

Figure 7-1: Structure of the Electric Power System



Source: InterVISTAS Consulting Inc., based on Massachusetts Institute of Technology, *The Future of the Electric Grid*, 2001.

When Congress enacted the FPA in 1935, electric utilities were mostly vertically integrated firms that constructed and operated their own generation, transmission, and distribution facilities. The firms acted as separate, local or regional monopolies, and consumers (households, commercial and industrial businesses) in those areas paid a single “bundled” rate for electricity (“bundled” reflecting the costs of generation, transmission, and delivery). Rates paid by consumers were subject to approval by local or state public utility commissions.

With greater demand for electricity from a growing economy came the need for sharing generation resources. To ensure the reliable provision of electricity to consumers, utilities needed reserve generation capacity. However, building generating facilities is extremely expensive. The solution to high reserve costs was to share reserves with adjacent utilities. Instead of building two large units, utilities could buy power from their neighbors in times of need, and cut their costs significantly. To facilitate reserve sharing, utilities built high-voltage interconnecting transmission lines large enough to deliver power in case of a major generator outage.²⁹⁰ As utilities discovered the benefits of interconnecting to reduce reserve costs and generate power from the lowest-cost sources, they formed voluntary power pools, which evolved into the current regional transmission organizations.

²⁹⁰ FERC Division of Energy Market Oversight, “Energy Primer: A Handbook of Energy Market Basics,” Staff Report, 2015, <http://www.ferc.gov/market-oversight/guide/energy-primer.pdf>

The market for electricity underwent significant changes during the 1960s and 1970s. During this period, the construction of nuclear and other capital-intensive facilities contributed to cost increases and uncertainties in the industry. These investments were undertaken under the assumption of continued increases in demand. However, that expectation failed to materialize due to conservation efforts and an economic downturn. As a result, expensive large power plants for which there was little or no demand came onto the market or were in the process of being constructed. Between 1970 and 1985, average residential electricity prices more than tripled in nominal terms, and increased by 25% after adjusting for general inflation. Average electricity prices for industrial customers more than quadrupled in nominal terms over the same period and increased 86% after adjusting for inflation.²⁹¹

In 1992, Congress enacted the Energy Policy Act.²⁹² A goal of that Act was to promote greater competition in bulk power markets by encouraging new generation entrants and by expanding the Commission's authority to approve applications for transmission services.

The Commission independently undertook actions to facilitate the development of a more competitive market. Among those was a 1994 proposed rule to provide greater access to transmission facilities that ultimately led to the restructuring of the electric industry. FERC recognized that the trend toward greater transmission access and the transition to a fully competitive bulk power market could cause some utilities to incur "stranded costs" as customers used their incumbent electricity supplier's transmission to purchase power elsewhere.²⁹³ A utility may have built facilities or entered into long-term fuel supply contracts with the reasonable expectation that its customers would renew their contracts and pay their share of long-term investments and other incurred costs. If the customer subsequently obtained another power supplier via a newly-competitive market, the utility may have stranded costs. If the utility could not locate an alternative buyer or somehow mitigate the stranded costs, then "the costs must be recovered from either the departing customer or the remaining customers or borne by the utility's shareholders."²⁹⁴ Accordingly, the Commission proposed to establish provisions concerning the recovery of wholesale and retail stranded costs by public utilities and transmitting utilities.²⁹⁵

In short, over time, the electric industry had experienced fundamental changes: Electric systems had become increasingly interconnected, long distance transmission had become increasingly economical,

²⁹¹ See Federal Energy Regulatory Commission, Final Rule, "Promoting Wholesale Competition through Open Access Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities," *Federal Register* 61, no. 92 (May 10, 1996): 21543-21544, <https://www.gpo.gov/fdsys/pkg/FR-1996-05-10/pdf/96-10694.pdf>.

²⁹² *Energy Policy Act of 1992*, Public Law 102-486, *U.S. Statutes at Large* 106 (1992): 2776-3133.

²⁹³ Federal Energy Regulatory Commission, Notice of Proposed Rulemaking, "Recovery of Stranded Costs by Public Utilities and Transmission Utilities," *Federal Register* 59, no.131 (July 11, 1994), 32,507, <https://www.govinfo.gov/content/pkg/FR-1994-07-11/html/94-16626.htm>

²⁹⁴ *Ibid.*, 32,864.

²⁹⁵ Final Rule, *Promoting Wholesale Competition through Open Access Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities*, Order No. 888, 75 FERC ¶ 61,080 (1996), 61 Fed. Reg. 21450, 21549 (May 10, 1996): (Order No. 888), <https://www.gpo.gov/fdsys/pkg/FR-1996-05-10/pdf/96-10694.pdf>.

and smaller, lower-cost power plants had begun to emerge as competitors to the vertically integrated utilities.²⁹⁶

FERC Order 888: Promoting Wholesale Competition through Open Access Non-Discriminatory Transmission Services

In 1996, FERC responded to these changes and market conditions by adopting reforms to the electric industry. In Order No. 888, the Commission concluded that the economic self-interest of electric transmission monopolists – particularly those with high-cost generation assets – lay in denying transmission or offering it only on inferior terms to emerging competitors.²⁹⁷ Such behavior, the Commission argued, was counter to the mandate in FPA section 205 regarding undue prejudice or disadvantage. Given this defect in the market structure of the electric industry, FERC determined that “non-discriminatory open access transmission services” and “stranded cost recovery” were the most critical components of a successful transition to competitive wholesale electricity markets.²⁹⁸ Doing so would best ensure that consumers have the benefits of competitively priced generation.

In Order 888, the Commission required each public transmission providers to functionally unbundle its wholesale generation and transmission services and file an open-access transmission tariff (“OATT”) containing minimum terms of non-discriminatory transmission service.²⁹⁹ By “functionally unbundle,” FERC required that public utilities state separate rates for wholesale generation, transmission, and ancillary services (among other things). Through these structural changes, the Commission sought to open the electric grid to all sources of electric power.³⁰⁰ To promote development of competitive markets, the Commission encouraged the formation of regional transmission organizations (“RTOs”) and independent system operators (“ISOs”) to coordinate transmission planning, operation, and use on a regional and interregional basis.³⁰¹

FERC stopped short of requiring the formation of RTOs or ISOs, and decided to allow some time for the market to adjust. “[W]e believe that the less intrusive functional unbundling approach ... is all that we must require at this time. Nevertheless, we see many benefits in ISOs, and encourage utilities to consider ISOs as a tool to meet the demands of the competitive marketplace.”³⁰²

FERC Order 2000: Regional Transmission Organizations

By the end of 1999, having watched the market adjust to the requirements in Order 888, FERC determined that additional changes were needed to promote efficiency in wholesale electricity markets and to ensure that electricity consumers pay the lowest price possible for reliable service. Retail access was adopted by approximately 25 states in the late 1990s. Trade in bulk power markets increased

²⁹⁶ See Order No. 888, 61 Fed. Reg. at 21543–46.

²⁹⁷ *Ibid.*, 21567.

²⁹⁸ *Ibid.*, 21550.

²⁹⁹ *Ibid.*, 21541, 21551–52.

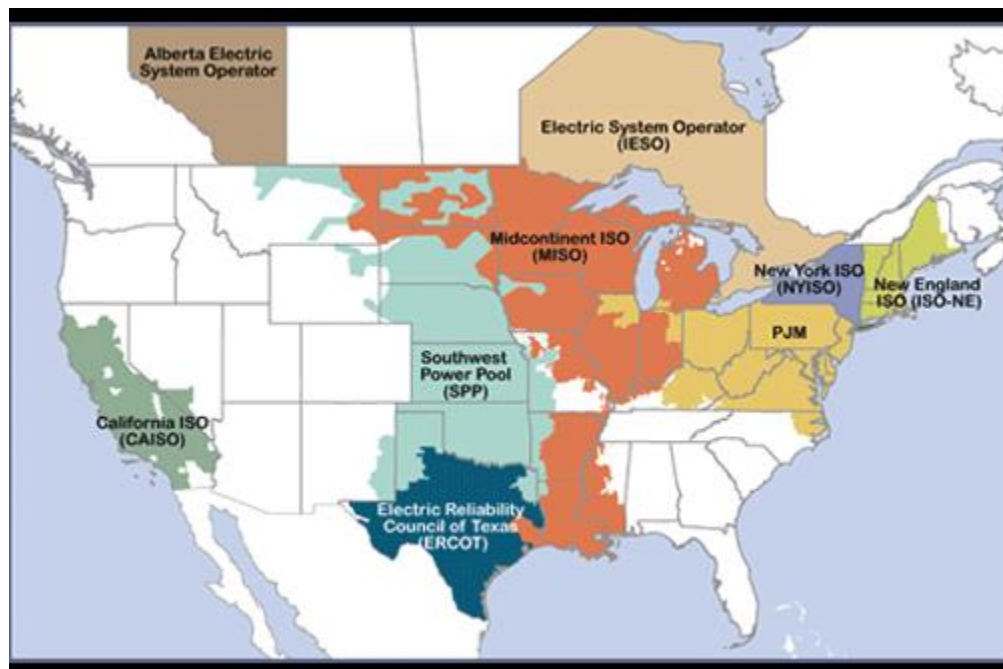
³⁰⁰ *Ibid.*, 21550.

³⁰¹ *Ibid.*, 21552, 21666–67. The validity of Order No. 888 and related decisions were affirmed on appeal in *Transmission Access Policy Study Group v. FERC*, 225 F.3d 667 (D.C. Cir. 2000).

³⁰² *Ibid.*

significantly and the Nation's transmission grid was used more heavily and in new ways as customers took advantage of open access and purchased power from competitive sellers. However, the Commission concluded that “the continuing opportunity for undue discrimination [is] impeding competitive markets.”³⁰³ Therefore, FERC issued Order No. 2000 to advance its objective that “all transmission-owning entities in the Nation, including nonpublic utility entities . . . place their transmission facilities under the control of appropriate RTOs in a timely manner.”³⁰⁴ The Commission’s proceedings in Orders Nos. 888 and 2000, along with the efforts of the states and the industry, led to the voluntary organization of ISOs and RTOs. (See **Figure 7-2**) Each of the ISOs and RTOs subsequently developed a full scale energy and ancillary service market in which buyers and sellers could bid for or offer generation. The ISOs and RTOs used the bid-based markets to determine economic dispatch.³⁰⁵ FERC again relied on the industry to adopt the structure voluntarily. It cautioned that it would resort to more directive regulatory actions if the industry failed to do so.³⁰⁶

Figure 7-2: Regional Transmission Organizations / Independent System Operators



Source: <http://www.ferc.gov/industries/electric/indus-act/rto.asp>

In February 2007, FERC adopted a final rule reforming its decade-old open-access transmission regulatory framework intended to ensure transmission service is provided on a nondiscriminatory and just and reasonable basis, as well as provide for more effective regulation and transparency in the operation

³⁰³ Final Rule, *Regional Transmission Organizations* Order No. 2000, 89 FERC ¶ 61,285 (1999), 65 Fed. Reg. 810, 825 (Jan. 6, 2000), <https://www.gpo.gov/fdsys/pkg/FR-2000-01-06/pdf/00-2.pdf>

³⁰⁴ Order No. 2000, 89 Fed. Reg. at 811.

³⁰⁵ FERC Division of Energy Market Oversight, “Energy Primer,” 40.

³⁰⁶ Order No. 2000, 89 Fed. Reg. at 811.

of the transmission grid.³⁰⁷ The rule was designed to: (1) strengthen the pro forma open-access transmission tariff to ensure that it achieves its original purpose of remedying undue discrimination; (2) provide greater specificity to reduce opportunities for undue discrimination and facilitate the Commission's enforcement; and (3) increase transparency in the rules applicable to planning and use of the transmission system.

7.3.2 FERC's Economic Regulatory Approach of Electricity Transmission

While FERC oversees the functioning of electric commodity markets to prevent market manipulation, the focus here is on FERC's regulation of interstate electric transmission facilities and services. Unless a utility or other transmission service provider can show that the market for its services is competitive, FERC requires the provider to establish cost-based maximum rates for its services. This type of cost-of-service ratemaking is sometimes referred to as rate-base rate-of-return regulation (RBROR). Under this method, FERC determines an annual cost of service for the utility including operating costs, depreciation, taxes and a reasonable rate of return on the utility's investment in transmission facilities based on original cost less depreciation. Specific costs may be classified as fixed or variable and allocated to various types of service. Rates are then designed to recover the annual cost of service over estimated annual units of service. Regulated transmission companies, which are required to provide open access to their electric grids, use various forms of pricing to recover their costs of providing service. Most rates for firm transmission service include a fixed reservation rate that covers fixed costs and a volumetric component based on projected usage. Rates can be zone specific (license plate pricing), depend on the distance (point to point sensitive), or be the same whatever the distance (postage stamp pricing).³⁰⁸ Postage stamp pricing is a form of uniform pricing method applied in a defined area.

As noted, utilities and other service providers may file with FERC to increase their rates or change their terms and conditions under section 205 of the FPA, and existing rates, terms and conditions may be subject to investigation under section 206 on complaint or on FERC's own initiative. Rates are rejected if they are found "unjust and unreasonable" or "unduly discriminatory and preferential." If FERC finds a proposed rate to be unjust and unreasonable, it may prescribe a reduced "just and reasonable" rate. A proposed rate may be reduced for various reasons, including because the proposed operating or other costs are too high, the depreciation is excessive or the rate of return on equity (ROE) is outside the upper band of a ROE range computed using FERC's preferred Discounted Cash Flow model.³⁰⁹ If FERC receives a complaint, it can either institute an oral hearing procedure to gather more information or utilize an alternative dispute resolution procedure. There is a simplified procedure that can be used if a dispute involves less than \$100,000.³¹⁰

³⁰⁷ Final Rule, *Preventing Undue Discrimination and Preference in Transmission Service*, Order No. 890, 72 Fed. Reg. 12,266 (2007).

³⁰⁸ The Regulatory Assistance Project, "Electricity Regulation in the US: A Guide" (2010), 67, <http://www.raponline.org/document/download/id/645>

³⁰⁹ Ibid.

³¹⁰ Greenfield, Lawrence R., "An Overview of the Federal Energy Regulatory Commission and Federal Regulation of Public Utilities in the United States," Office of the General Counsel, Federal Energy Regulatory Commission, 2010, <http://www.ferc.gov/about/ferc-does/ferc101.pdf>

FERC ratemaking accommodates some amount of differential pricing by transmission providers. Transmission rates are stated as maximum rates, which can be discounted down to variable costs. Discounting is recognized in estimating the units of service used to design rates. FERC also permits firm service holders to sell their firm transmission rights in public secondary transmission markets.

7.3.3 Overview of the Structure of the Natural Gas Industry

The natural gas industry is composed of three major segments--production, transmission, and distribution.

- The production segment is made up of natural gas producers who explore for and extract gas from the ground.
- The transmission sector consists of pipelines, or transmission companies, that historically purchased natural gas from producers or other suppliers, and delivered and resold the gas primarily to state-regulated distributors and also to large end-users.³¹¹ Since the mid-1990's, interstate pipelines have "unbundled" their services under restructuring requirements imposed by FERC and today primarily provide transportation services (i.e., delivery of gas for customers who have purchased their supply from a separate producer). Pipelines may transport gas within the boundaries of a single state (intrastate) or between states (interstate).
- The distribution sector consists of local distribution companies (LDCs), primarily local public utilities that make gas purchases and high pressure gas transmission arrangements then resell and deliver the gas to residential, commercial, and industrial end-use customers.

Historically, the structure of the natural gas industry regulated under the NGA was simple. The producers would sell their natural gas in the production area to the interstate pipelines at FERC-determined just and reasonable rates. The pipelines would transport their purchased gas and their own production to the LDCs at FERC-determined just and reasonable rates which recovered both the pipelines' cost of gas and cost of transmission.³¹²

About 302,000 miles of interstate and intrastate transmission pipelines transport natural gas from the producing and processing areas to storage facilities and distribution centers. More than 300 companies operate mainline transmission pipelines.³¹³

7.3.4 Pricing of Natural Gas Services

Pipeline company gas transportation, storage and related services are sold on either a firm or interruptible basis. Firm service, which is primarily purchased by LDCs on behalf of residential and commercial end-

³¹¹ In addition to producers, a supplier of natural gas can be a pipeline or a local distribution company that provides natural gas to an interstate pipeline company, local distribution company, or end-user. Shippers of gas can include producers, pipelines, or other entities.

³¹² Federal Energy Regulatory Commission, Final Rule, "Restructuring of Pipeline Services," *Order No. 636* (April 8, 1992), 13, <http://www.ferc.gov/legal/maj-ord-reg/land-docs/restruct.asp>.

³¹³ U.S. Energy Information Administration, "Natural Gas Pipelines," November 30, 2015, http://www.eia.gov/energyexplained/index.cfm?page=natural_gas_pipelines

users and by electric generators for baseload generation, guarantees the delivery of gas, particularly during periods of peak demand on the pipeline system, such as cold winter days. In contrast, interruptible service, which is primarily purchased directly by industrial customers or by LDCs on behalf of industrial end-users, is subject to curtailment or interruption. This kind of service is generally used by those who can switch to other fuels when their gas deliveries are interrupted. Because firm service is more reliable, it is generally priced higher than interruptible service.

From an economic viewpoint, the transportation of natural gas has both large fixed costs (from the initial construction of the pipeline) and low marginal costs (compared to the fixed costs). The fixed costs, combined with the long lifetime of pipeline infrastructure, require pipeline companies to search for long-term contracts. Baseload electric generation plants and local distribution companies likewise often need to have the certainty of long-term transportation and gas supply contracts to meet the commitments to their customers.³¹⁴

Pipeline companies assess two charges: (1) a commodity or usage charge -- a fee determined by the volume of gas transported -- and (2) a demand or reservation charge -- a fee for the customer's right to reserve capacity on a pipeline company's system. Customers with firm service pay both a usage fee and a reservation charge because they have a right to service and essentially have reserved to themselves a portion of the pipeline's capacity. Customers with interruptible service pay only a commodity charge, since they do not reserve pipeline capacity, but the maximum usage charge for interruptible service may be higher than the volumetric charge for firm service depending on the rate design and allocation of costs to the various services. The commodity and demand charges allow the pipeline company to recover its costs of providing service and to earn a reasonable profit.

The method by which the company's costs are assigned to either the commodity or demand charge is commonly referred to as "rate design." Technically, FERC may assign costs to either the commodity or the demand charge. However, the variable costs associated with gas supplies and transportation are always applied to the usage charge. Historically, pipeline companies' fixed costs -- such as the depreciation of the pipeline, operation and maintenance expenses, and return on equity -- have been distributed between the commodity and demand charges in several ways, depending on FERC's policy goals.³¹⁵ Currently, FERC requires pipelines to use the straight fixed-variable (SFV) rate design under which all of the fixed costs assigned to firm service are recovered in the reservation charge. However, a small portion of the fixed costs may be allocated to interruptible service and recovered along with variable costs in the rate for interruptible service.

7.3.5 Evolution of the Industry and its Regulation

Federal regulation of the natural gas industry evolved in conjunction with changes in the nation's policy toward energy and changes in the industry's structure.

³¹⁴ Viscusi et al., *Economics of Regulation*, 672.

³¹⁵ U.S. General Accounting Office, "Natural Gas: Costs, Benefits, and Concerns Related to FERC's Oder 636," GAO/RCED-94-11 (Washington, DC, 1993), 4-5, <https://www.ferc.gov/legal/maj-ord-reg/land-docs/gao-636study-1993.pdf>

Interstate natural gas shortages in the 1970s were the catalyst for reform of the regulation of the natural gas industry. Congress responded to the natural gas shortages by enacting the Natural Gas Policy Act of 1978 to increase the flow of gas into the interstate market.³¹⁶ Among other things, this act removed much of the pricing of the nation's natural gas supplies from the Commission's regulatory jurisdiction. The intent was "to provide investors with adequate incentives to develop new sources of supply."³¹⁷

Structural problems remained, however, because interstate pipelines controlled the interstate transportation network and were unwilling to offer unbundled transportation and storage service to existing customers to whom they were selling and delivering gas as part of a bundled service. Moreover, FERC allowed interstate pipelines to "track" the cost of the gas commodity through a rate mechanism known as a "purchased gas adjustment" (PGA) clause. Once wellhead price controls were lifted for "new" gas supplies, many pipelines entered into contracts to purchase gas at excessively high prices believing that gas shortages would persist and they would be able to recover the cost of this high-priced gas through their PGA clauses. Local distribution companies balked at these high prices because their price-sensitive industrial customers were switching from gas to other fuels and demanded the ability to make their own gas supply arrangements. By 1992, FERC had determined that the pipeline companies retained a competitive advantage over other gas sellers because of their ability to combine transportation, storage, and other services.

FERC responded by issuing Order 636, known as the Restructuring Rule, which was designed to allow more efficient use of the interstate natural gas transmission system by fundamentally changing the way pipeline companies conduct business. Order 636 required interstate pipeline companies to unbundle, or separate, their sales, storage, and transportation services. Unbundling increased competition among gas sellers and diminished the market power of pipeline companies. Among other things, the order required pipeline companies to:

- Provide open-access transportation services that are equal in quality, whether the gas is purchased directly from the pipeline or from another provider, such as from a producer or a marketer.
- Provide firm sales customers with "no-notice" transportation and storage services that would allow them to have the same flexibility to meet unanticipated daily demand swings that they previously had with unbundled sales service. Pipelines were allowed to retain some of storage for supply and demand management, but they had to offer any additional storage as an unbundled service. Storage is integral to the efficient and reliable distribution of natural gas and provides the means to supply consumers' needs at times when their requirements exceed total gas production and mainline transmission capability.
- Redesign their transportation tariff rates so that the majority of fixed costs would be recovered through the capacity reservation fee charged to firm customers. This reservation fee is charged on a monthly basis to reserve daily capacity based on the maximum daily quantity included in the customer's firm service agreement. Thus, local distribution companies with temperature-sensitive residential customers will contract for sufficient firm transportation and storage capacity to meet

³¹⁷ Ibid., quoting *Pub. Serv. Comm'n of N.Y. v. Mid-Louisiana Gas Co.*, 463 U.S. at 334.

the peak period requirements of these seasonal demands. As noted, interruptible customers do not reserve daily capacity and are not charged a reservation fee, although the maximum interruptible rate may include recovery of some fixed costs. Variable costs are recovered through a usage fee applied on a volumetric basis to the gas actually transported. The new rate design (straight fixed-variable), which FERC continues to use, was intended to help promote competition among gas suppliers by eliminating any price distortions inherent in the previously used rate design (modified fixed-variable), which allocated certain fixed costs such as return on equity and related taxes to a commodity (usage) charge. This charge was levied on a per unit basis and applied to the volume of gas actually used, thus affecting costs for firm and interruptible customers alike.³¹⁸

FERC regulation of the rates for pipeline transportation and storage service under Sections 4 and 5 of the Natural Gas Act is similar to FERC's regulation of the rates for the interstate electric transmission network. FERC treats pipelines as having market power requiring cost of service regulation unless the pipeline can show that the market for the service is competitive. In the absence of competition, FERC employs RBROR-type regulation, which involves determining the revenue requirement (including operating expenses, taxes, depreciation, and a fair rate of return on investment), classifying the costs as fixed or variable, allocating costs to services, and designing rates to recover the revenue requirement. FERC's regulation of pipeline rates permits a level of differential pricing because FERC approves maximum rates, for firm transportation and storage services, which pipelines can then discount down to variable costs. Moreover, the holders of firm transportation and storage service can resell their capacity in secondary markets. FERC may initiate a review of existing rates under Section 5 of the NGA or review a pipeline-initiated rate change under Section 4.

7.3.6 Assessment of the Suitability of FERC's Regulation of Electricity and Natural Gas to Freight Rail

We do not believe that FERC's approach to regulating energy transmission – either electricity or natural gas – represents a suitable alternative to the STB's approach to freight rail rates. Adopting an approach similar to FERC's would be a departure from the principles underlying CMP and the current STB methods of approximating CMP. Moreover, FERC's regulatory format is intrusive and wide in scope. It requires the regulation of all rates unless the regulated company can prove that the market for its services is competitive and that regulation, therefore, is unnecessary. Unlike the Interstate Commerce Act, where railroads are presumed not to have market dominance where the R/VC ratio of the rate is below 180%, FERC grants market-based rate authority only to utilities that can demonstrate that they do not possess horizontal or vertical market power based on market shares, market concentration, open-access transmission filings and other factors.³¹⁹

FERC regulation also requires setting cost-based maximum rates rather than demand-based maximum rates for every service that is not market-based. Even with discounting, this approach, if applied to rail,

³¹⁸ "FERC Order 636: The Restructuring Rule (1992)," U.S. Energy Information Administration, http://www.eia.gov/oil_gas/natural_gas/analysis_publications/ngmajorleg/ferc636.html

³¹⁹ See generally, Final Rule, Refinements to Policies and Procedures for Market-Based Rates for Wholesale Sales of Electric Energy, Capacity and Ancillary Services by Public Utilities, Order No. 816, 80 Fed. Reg. 67,056 (Oct. 30, 2015).

would greatly restrict the flexibility to rail carriers to differentially price rail services. Cost-based ratemaking using the RBROR approach inevitably would under-price highly valuable services. This would require higher mark-ups on the most price sensitive traffic, potentially leading to the loss of these shippers and their contributions, even if modest, to railroad fixed costs.

Using the FERC's approach, the STB's regulatory tasks would become increasingly expensive to administer and would create longer and inevitable regulatory delays. FERC regulates transportation, storage and ancillary services related to largely homogenous commodities – natural gas and electricity. In contrast, under an approach similar to that used by FERC, the Board would have to allocate the railroad's revenue requirement, allocate costs and design rates for the movement of multiple heterogeneous products and commodities having vastly different market values, weights and densities, and compositions that use different types of railcars. This form of regulation would not be a simplification for STB, nor would it improve economic efficiency. Rather, it would be a return to the pre-Staggers Act method of regulation that Congress rejected.

7.4 Experience in U.S. Telecommunications with TELRIC

Telecommunications Regulatory Reform. The historical regulatory approach for the U.S. telecommunications industry was predicated on the belief that telecommunications services could be provided at the lowest possible cost by a monopoly provider. The Federal Communications Commission (FCC) and various state regulators thus were originally tasked with regulating the prices charged by the various telephone monopolies. To pursue the goal of universal service, the regime included substantial cross subsidies, by charging higher rates for some services (e.g., long distance, large urban phone services) to allow lower prices for other services.

The Telecommunications Act of 1996³²⁰ ultimately changed this approach. As the FCC noted:

*Rather than shielding telephone companies from competition, the 1996 Act requires telephone companies to open their networks to competition.*³²¹

Congress gave the FCC a very different mandate with respect to the telecommunications industry than it gave to the STB in ICCTA and the ICC in Staggers with respect to the rail industry. The intent of the Telecommunications Act of 1996 was to open the industry to competition at the retail level. At the time, local monopolization of the infrastructure for originating and terminating access (i.e., the local service components for a long-distance service) was very lucrative as these were essentially bottleneck services. The Telecommunications Act of 1996 sought to ensure that access to this infrastructure would be opened up to competitors. Unlike the case of railroads, the objective of the telecommunications legislation did not include a mandate to promote the financial viability of the existing providers of the bottleneck infrastructure. The FCC's mandate was to ensure competitive access by opening incumbent local exchange carriers' networks to competitors for these services.³²²

³²⁰ Pub. L. No. 104-104, 110 Stat. 56 (Feb. 8, 1996).

³²¹ *First Report and Order*, Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, FCC 96-325 para. 1, 11 FCC Rcd 15499 (FCC Released Aug. 7, 1996) ("*First Report and Order*").

³²² The FCC in effect is focused on the dynamic efficiency issue. The STB, with its foundation of Constrained Market Pricing based on Ramsey pricing, also considers allocative efficiency.

Access prices based on incremental, not total cost. To make this open access regime work, the FCC was required to develop a methodology for determining access prices that would promote entry. A methodology that resulted in high access prices would likely lead to limited or no competitive entry. Thus, the 1996 Act required that charges for interconnection and network elements:

*[S]hall be – (i) based on the cost (determined without reference to a rate-of-return or other rate-based proceeding) of providing the interconnection or network element (whichever is applicable), and (ii) nondiscriminatory, and ... may include a reasonable profit.*³²³

The 1996 Act provided for compensation to existing network infrastructure providers on the basis of “additional costs” which might be broadly viewed as the telecommunications equivalent of long run variable costs in the railroad industry.³²⁴

TELRIC. The pricing concept the FCC developed to implement its access pricing mandate was the Total Element Long Run Incremental Cost (TELRIC) approach. This was a version of what was known as Total Service Long Run Incremental Cost (TSLRIC).

The FCC, in its First Order and Report, described the TELRIC approach:

*We conclude that, under a TELRIC methodology, incumbent [local exchange carriers’] prices for interconnection and unbundled network elements shall recover the forward-looking costs directly attributable to the specified element, as well as a reasonable allocation of forward-looking common costs. Per-unit costs shall be derived from total costs using reasonably accurate “fill factors” (estimates of the proportion of a facility that will be “filled” with network usage); that is, the per-unit costs associated with a particular element must be derived by dividing the total cost associated with the element by a reasonable projection of the actual total usage of the element. Directly attributable forward-looking costs include the incremental costs of facilities and operations that are dedicated to the element. Such costs typically include the investment costs and expenses related to primary plant used to provide that element. Directly attributable forward-looking costs also include the incremental costs of shared facilities and operations. Those costs shall be attributed to specific elements to the greatest extent possible.*³²⁵

The basic steps in conducting a TELRIC assessment are:

1. Determine the incremental demand for the service (or group of services) over the period in question;
2. Determine the network to meet this incremental demand based on the most efficient technology that would be deployed in the incumbent’s current wire center locations during the period in question;

³²³ 47 U.S.C. § 252(d)(1).

³²⁴ 47 U.S.C. § 252(d)(2)(A). The key text states “(ii) such terms and conditions determine such costs on the basis of a reasonable approximation of the *additional costs* of terminating such calls.” (emphasis added)

³²⁵ *First Report and Order*, para. 682.

3. Determine the time frame in which this hypothetical network is built to deal with the incremental demand (i.e., all at once, or spread out over time);³²⁶
4. Determine the existing base of assets/services to which the incremental new network is to be added;
5. Specify provisioning rules and capacity/demand balance;
6. Determine the operating and maintenance cost of the modelled network;
7. Determine common costs (e.g., overhead) that cannot be specifically attributed to a particular service and determine a reasonable share of these costs that should be allocated to each service;
8. Determine capital costs, including rate of return; and
9. Allocate the total costs to the services in question.³²⁷

FCC allocation of common costs. The FCC acknowledged that, in setting access rates, there will be some common costs that need to be allocated in a “reasonable” manner and determined that allocating common costs as a fixed percentage mark-up over the directly attributable costs would be a reasonable approach. Another reasonable approach, according to the FCC, would be to allocate a small share of common costs to critical network elements.³²⁸

The FCC does not allow demand-based allocation of common costs. It explicitly cites as unacceptable the allocation of common costs based on “inverse proportion to the sensitivity of demand” (i.e., Ramsey pricing).³²⁹ This follows from its mandate to promote competitive entry. The FCC has no mandate to ensure the financial viability of the incumbents, much less to encourage the use of differential pricing to achieve that financial viability with maximum economic efficiency. Stimulating competition is the driver.

Forward-looking costs based on best-available technology. According to Beshers, the long-run incremental cost definition in the TELRIC approach is no different, in principle, from the concept of incremental cost in the ECPR (discussed later in this chapter):

What is different is that the TELRIC definition of incremental cost is based not on the costs of the equipment or facilities an entrant would be using, but on the costs of a hypothetical network. The hypothetical network would “employ the most efficient technology for reasonably foreseeable capacity requirements.”³³⁰

³²⁶ Note that the “hypothetical” network under TELRIC assumes the most efficient technology available would be deployed at the incumbent’s current wire center locations. (*First Report and Order*, para. 685). It is not hypothetical in the sense of being a completely different network from what currently exists, but it is hypothetical in the sense that it builds on the existing centers *using better technology*. It thus differs from the Full-SAC process, where a stand-alone railroad could be entirely hypothetical (i.e., completely different from the existing network) but has similarity with the Simplified-SAC process that uses the existing network of the incumbent.

³²⁷ This list is based in part on Ergas, Henry, “TSR/LRIC, TELRIC and Other Forms of Forward-Looking Cost Models in Telecommunications: A Curmudgeon’s Guide,” Center for Research in Network Economics and Communications, the University of Auckland, 1998.

³²⁸ *First Report and Order*, para. 696.

³²⁹ *Ibid.*

³³⁰ Beshers, “Efficient Access Pricing,” 25.

In other words, with TELRIC, it is necessary to forecast future demand and decide what the network would consist of, and what it would cost if it were built today with the “most efficient technology.” Those costs are then to be used as the basis for setting prices for use of the existing elements.”³³¹

The need to estimate forward-looking costs based on a future network that uses the best technology of that time has led to some criticisms of the approach. Beshers summarizes Kahn, Tardiff, and Weisman’s criticisms as being “largely concerned with TELRIC’s requirement that incremental costs be based on a hypothetical network. Kahn asserts that basing costs on a hypothetical plant with the best available technology cannot reflect real-world costs, because real firms do not continually scrap their plants and invest in new ones as soon as a new, improved technology becomes available.”³³²

Some stakeholders maintain that the use of historic or sunk costs is the more appropriate basis for determining costs. The FCC, however, has concluded that, even where there are significant sunk costs, it is the forward-looking costs that are still relevant. It notes:

*The TELRIC of an element has three components, the operating expenses, the depreciation cost, and the appropriate risk-adjusted cost of capital. We conclude that an appropriate calculation of TELRIC will include a depreciation rate that reflects the true changes in economic value of an asset and a cost of capital that appropriately reflects the risks incurred by an investor. Thus even in the presence of sunk costs, TELRIC-based prices are an appropriate pricing methodology.*³³³

In *Verizon Communications, Inc. v. FCC*, 535 U.S. 467 (2002), the Supreme Court held that TELRIC’s forward-looking cost approach was reasonable and did not violate the Telecommunications Act of 1996.

TELRIC access prices potentially may not result in coverage of total infrastructure costs. Beshers notes that Sidak and Spulber point out that TELRIC, as established by the FCC, “prevents incumbents from recovering costs. They argue that the ban on Ramsey pricing, plus a requirement that most prices should be below SAC, make it impossible for an incumbent to recover total costs.”³³⁴

A number of stakeholders have argued that any pricing rules that do not enable service providers to recover total costs, including historic and embedded costs, constitute an “unlawful taking.” However, the Supreme Court concluded in *Verizon* that there was no evidence to support the contention that TELRIC constituted a taking. The Court noted that it was not provided with any actual TELRIC prices and proof that they were confiscatory, but only with some network level comparisons of historical costs versus a TELRIC evaluation. It found some errors in the numbers being compared, and noted: “What the best

³³¹ Ibid.

³³² Ibid., 27.

³³³ *First Report and Order*, para. 703. The FCC goes on to define depreciation as “the method of recognizing as an expense the cost of a capital investment. Properly calculated economic depreciation is a periodic reduction in the book value of an asset that makes the book value equal to its economic or market value.” (footnote 1711)

³³⁴ Beshers, “Efficient Access Pricing,” 27. Beshers references Sidak, J. and D. Spulber, *The Tragedy of the Telecommons: Government Pricing of the Unbundled Network Elements under the Telecommunications Act of 1996*, 97 Colum. L. Rev. 1081 (1997).

numbers may be we are in no position to say: The point is only that the numbers being thrown out by the incumbents are no evidence that TELRIC lease rates would be confiscatory, sight unseen.”³³⁵

A potentially problematic criticism appears in Gans and King, who examined the difference between TELRIC and the TSLRIC model (from which TELRIC was derived). They concluded:

While many consider the two approaches to be practically the same, this report demonstrates that this is not the case on both a conceptual and practical level. We consider both the conceptual and the practical differences between TSLRIC and TELRIC. At a conceptual level, the two measures will differ whenever there are shared network elements and part of the cost of these elements is a common cost and part is an incremental cost of the services that use the shared element. There are likely to be many such elements in a fixed line telecommunications network. For example, most switches that are engineered to cope with total service flows have both common and incremental cost aspects.

In such situations, TELRIC modelling can potentially lead to inappropriate service pricing. We show that TELRIC pricing, when applied to services, cannot guarantee that service prices do not fall below the economically appropriate price floor set by long run incremental cost, and TELRIC pricing cannot guarantee that service prices do not rise above the economically appropriate ceiling set by stand alone cost. If TELRIC prices for services violate relevant price floors or price ceilings, then this implies that there are inappropriate economic service prices and that some services may be artificially cross subsidizing other services.”³³⁶

7.5 Is TELRIC Applicable to the Railroad Industry?

For the railroad industry, with its high proportion of unattributable common costs, use of TELRIC could be quite problematic. While TELRIC may be an appropriate approach for the telecommunications industry, we do not believe it is appropriate for use by the STB in executing its mandate under ICCTA for several reasons:

- TELRIC is a methodology to establish access prices.
It might have some relevance in a rail transport regime with open access, or in exceptional cases where the access price needs to be established. It was not intended to be used to establish prices for the end customer (the shipper).
- Forward-looking cost estimates must be developed.
As implemented by the FCC, both the entrant and the incumbent carriers are expected to develop forward-looking costs for the various elements of the network based on assumptions of the nature of the hypothetical network and demand for each element. The regulatory agency (FCC) then adjudicates and sets prices element by element. This is similar in nature to the SAC process, which allows the shipper to incorporate the best existing technology. If anything, the TELRIC

³³⁵ 535 U.S. at 526.

³³⁶ Gans, Joshua and Stephen King (CoRE Research Pty Ltd), “Comparing TSLRIC and TELRIC: A Report on Behalf of AAPT Ltd.” Melbourne, Australia, 2003,
<https://www.accc.gov.au/system/files/AAPT%20CoRE%20TSLRIC%20%26%20TELRIC-%20July%202003.pdf>

approach may be even more administratively burdensome than the existing maximum rate regulation procedures utilized by the STB due to uncertainties about the cost of future technologies in the rail industry.

- Economic efficiency is not the goal.
The prices that would be set for each element are not necessarily constrained by a SAC ceiling or average variable cost (or marginal cost) floor. This introduces the risk of economically inefficient prices being established – either prices too high or too low. It likely would still be necessary to conduct a SAC analysis to ensure the TELRIC price does not exceed SAC, and use URCS or some other method to ensure the TELRIC price is not below LRVC.
- The full recovery of common costs is a significant issue.
Ramsey pricing is explicitly rejected by the FCC in its application of TELRIC pricing in favor of some other “reasonable” distribution of common costs. As a result, this approach could place a greater cost burden on those with the greatest sensitivity to rail charges (i.e., higher charges for those with highest price elasticity of demand than is currently the case in the U.S. railroad industry). This would undoubtedly drive a significant proportion of traffic away from rail, leaving a smaller traffic base to cover the common costs. Thus, TELRIC could produce access prices that result in lower overall traffic levels than is what is economically efficient and leave the host carrier uncompensated for a portion of fixed costs.
- This would be a new regime that Congress would have to authorize through new legislation.
The combination of access to the rail network by competing carriers and the removal of focus on carrier revenue adequacy could potentially lead to a restructuring of the U.S. rail industry. Given that the U.S. rail industry is viewed as one of the most efficient, if not the most efficient, rail systems in the world, this would be a dramatic change for an industry that has undergone a significant revival since deregulation.

Eric Beshers made note of TELRIC’s inappropriateness for pricing rail bottlenecks, citing many of the above issues, among others. His rejection of TELRIC for rail is summarized in this comment: “The TELRIC methodology much more nearly resembles traditional, cost-based rate-of-return, rate regulation than it does constrained-market pricing. TELRIC embodies inefficient pricing principles and could not work in the current framework of railroad regulation or anything close to it.”³³⁷

Adapt TELRIC to establish shipper prices? While TELRIC was designed to establish access prices, conceptually it could be adapted to establish maximum prices for shippers, and thus be an alternative to SAC. Earlier, TELRIC was characterized as having nine steps to complete. It is the first step (determine the new demand on the network from the entrant carrier) and the fifth (balancing competing demands on capacity) that focus on access to the network. Eliminating those steps would leave a methodology that might be appropriate for maximum shipper rates.

However the remaining seven steps look very similar to SAC. An optimal network has to be designed, forward looking costs must be estimated for an appropriate time frame, and operating, maintenance and capital costs (including a reasonable return on capital) likewise must be determined.

³³⁷ Beshers, “Efficient Access Pricing,” iii-iv.

There are some steps unique to TELRIC, but they seek to achieve the same objective as SAC. TELRIC seeks to allocate common costs to the traffic in dispute as well as a share to all other traffic, although no theoretical guidance is given as to how those costs should be allocated. The FCC cost allocation methodology (e.g., use a constant percent mark-up over variable costs) would not ensure revenue adequacy, would drive some traffic off the rail network, and would not necessarily be economically efficient. In applying TELRIC in the rail context, however, it could be possible to use a different definition of a “reasonable” approach to allocating common costs to the traffic in dispute other than a fixed percentage mark-up or small allocation to critical network elements. (This would be similar to what the FCC had proposed with allocating common costs. See above.) If alternative definitions of “reasonable” are adopted that incorporate demand-based factors (such as price sensitivity) then one could protect revenue adequacy. This however, would require elements of Ramsey pricing (i.e. knowledge of elasticities of demand for all users). The FCC TELRIC implementation avoids this, but at the cost of revenue adequacy and economic efficiency.

SAC deals with the common cost allocation issue indirectly by netting from the total costs of the hypothetical network the contribution that could be obtained from other traffic. This achieves the same end as TELRIC.

In the end, it seems that while TELRIC, an access pricing methodology, could be adapted to replace SAC for determination of maximum allowable rates to be paid by a rail shipper, the resulting adaptation would have similar complexity to SAC. Simplifying TELRIC would require use of a simplistic cost allocation formula, such as the FCC uses, but with the consequence of abandoning revenue adequacy and economic efficiency goals.

In the end, it seems that while TELRIC, an access pricing methodology, could be adapted to replace SAC for determination of maximum allowable rates to be paid by a rail shipper, the resulting adaptation would have similar complexity to SAC.

The means to simplify TELRIC require use of a simplistic cost allocation formula such as the FCC uses, but with the consequence of abandoning revenue adequacy and economic efficiency goals

7.6 Application of TELRIC to Allocate Common Costs for the Two Rail Cases

Despite questions about the appropriateness of applying the TELRIC approach as generally adopted by the FCC to the U.S. freight rail industry, this section illustrates what TELRIC rates might look like if applied to the U.S. railroad industry. The two case studies used are the *Western Fuels Association (WFA)* and *Otter Tail* cases first described in Chapter 4.

For *WFA*, the unadjusted variable costs (calculated using URCS data) were available in the public case filings. In the *Otter Tail* case, unadjusted variable cost estimates were not available in the public case

filings. This report used URCS to estimate the unadjusted variable costs,³³⁸ although we point out that the URCS costs estimates are untested. Both cases estimated the variable costs of the crossover traffic based on the total operating expenses of the SARR less the variable costs of the traffic at issue.

As the fixed costs of the actual railroad were not available, as a proxy, the fixed cost of the SARR was used in each case.³³⁹

Three allocation methods computed. As previously indicated, a major problem with TELRIC is that the methodology provides no guidance as to how to allocate unattributable costs. The FCC has no revenue adequacy legislative objective and TELRIC advocates have arbitrarily proposed a number of possible methods. Here three different approaches to allocate the unattributable costs were considered, each of which has been proposed for possible use in TELRIC:

- A uniform mark-up percentage approach based on the average percentage mark-up that would be needed to cover the fixed and common costs;
- A mark-up based on the traffic's *tonnage* share of total carrier traffic; and
- A mark-up based on the traffic's *revenue* share of total carrier traffic.

For the uniform mark-up percentage approach, the mark-up was the ratio of fixed costs to total variable costs. The mark-up does not vary across the movements; it is the average needed to cover the fixed and common costs of the railroad.

To estimate the mark-up based on tonnage, the total fixed cost per ton of the railroad was computed.³⁴⁰ From this, we estimated the total fixed cost of the issue traffic. The mark-up was then calculated using the URCS variable costs and the estimated fixed cost of the issue traffic. While the specific assumptions made might legitimately be challenged, as will be seen the main point on the range of outcomes is unlikely to be changed.

A similar methodology was employed to calculate the mark-up based on revenue, which was estimated using the tonnage and rate information available in the case documents for both cases. The unattributable costs were estimated using the estimate of total fixed cost per dollar revenue, again, with total fixed costs for the SARR as a proxy for the actual railroad. **Figure 7-3** summarizes the results.

³³⁸ This use is consistent with the adaptation methodology applied to our Three-Benchmark analysis. The movement characteristics inputs for the program were based on the issue traffic found in the case filings.

³³⁹ Although this is a limitation of our analysis (and hence, an adaptation of the TELRIC approach), the purpose of the TELRIC analysis is to inform the STB of lessons that can be learned from other forms of regulation.

³⁴⁰ As noted previously, we relied on the costs and traffic of the SARR as a proxy for the actual railroad in each case.

Figure 7-3: Estimates of Percentage Markups from Applying Different TELRIC Methodologies to Two Rail Cases

Case	Full SAC markups	TELRIC Markup (Uniform %age)	TELRIC Markup (Tonnage Ratio)	TELRIC Markup (Revenue Ratio)
Otter Tail vs. BNSF	STB found BNSF rate not shown to be unreasonable. Inter VISTAS estimates the markup on BNSF to be 117% (RVC of 217%) ³⁴¹	70%	91%	157%
Western Fuels vs BNSF	STB found BNSF rate to be unreasonable. Final decision allowed rates with RVC of 230-269% ³⁴² [markup of 130-169%] Disputed rate was claimed by BN to have a 226% markup (RVC 336%) and by WFA as a 382% markup	88%	18%	94% (Unadjusted SARR revenue) 102% (Adjusted SARR Revenue)

Source: Inter VISTAS Analysis using publicly available case file data.

It is noted that while Figure 7-3 summarizes the estimates of the adapted TELRIC mark-ups to the mark-ups from the Full-SAC analysis, they are not directly comparable. The STB markups are for the final rate paid by the shipper to the railroad. In contrast, the TELRIC methodology sets the markup for the access fee to be paid by the competing carrier to the incumbent carrier. The actual markup on the rate paid by the shipper to competing carrier could be higher or lower.

Comparing the mark-ups, the TELRIC mark-ups are mostly below the SAC mark-ups. This result is not surprising, as the purpose of TELRIC is to generate competition, and not ensure revenue adequacy. Another important observation is that the three methods for allocating unattributable costs vary quite largely, yet all might be considered “reasonable” under the TELRIC approach. The TELRIC methodology does not ensure revenue adequacy for the carrier nor inform the regulator as to which cost allocation methodology is appropriate.

³⁴¹ At the time of this case, the STB allowed the shipper and carrier to adjust URCS variable costs estimates and BNSF’s figure was RVC of 228%, while Ottertail’s figure was 284%. Subsequently the STB prohibited such movement-specific adjustments. InterVISTAS estimated that the unadjusted RVC would be 217%, although this has not been reviewed or established by the STB and is only a rough estimate.

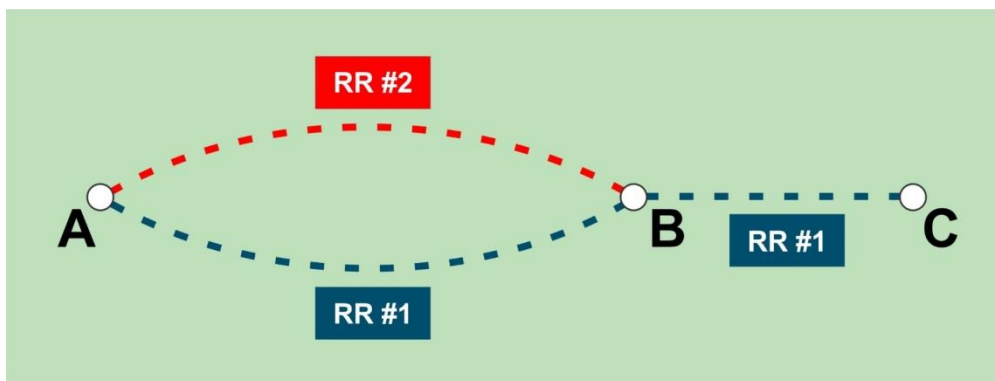
³⁴² Depending on the year, since the STB’s rate prescription covers 20 years.

7.7 Efficient Components Pricing Rule (ECPR) - Concepts

Another proposed approach to access pricing is the Efficient Component Pricing Rule (ECPR). The ECPR requires that the price of access to a bottleneck segment to be paid by a competing tenant carrier include an amount for the net contribution the vertically integrated carrier had previously received toward common costs plus all relevant costs of providing access. This ensures that the common costs of the carrier controlling the bottleneck segment are covered, thus preserving revenue adequacy of the landlord carrier.

ECPR can be conceptualized for the case where an incumbent railroad (RR #1) carries a shipper's traffic from point A to point C, via Point B. A competing carrier (RR #2) is able to carry the traffic from A to B, but cannot get the shipment the final distance from B to C, as only RR #1 has track from B to C. The monopoly segment B to C is referred to as a "bottleneck." This is depicted in the often duplicated diagram from a 2000 Volpe National Transportation Systems Center paper by Eric Beshers.³⁴³

Figure 7-4: Railroad Bottleneck



Source: InterVISTAS representation of figure from Beshers, Eric, "Efficient access pricing for rail bottlenecks."

The job for ECPR is to establish an access price, to be paid by RR #2 to RR #1, for use of the latter's B to C bottleneck track. This is an access regime. If an appropriate access price can be established for the B to C bottleneck track, then there would be no need to regulate the maximum price RR #1 charges to the shipper for moving traffic from A to B. Competition from RR #2 (or retaliatory pricing from RR #1) would constrain the A to C price charged by RR #1. Of course, there is still a regulatory job, that of establishing the appropriate access price.

The challenge for ECPR is to set the access price so that competition is encouraged and enabled, while not undermining the revenue adequacy of RR #1. If RR #1 has only the one customer, and if its revenue is adequate on the B to C segment, without earning any profit above revenue adequacy, then the ECPR challenge is straightforward: the access price must cover the contribution to RR #1's B to C common costs that it had been earning (plus any new costs, such as administrative costs, involved in facilitating RR #2's use of the B to C track). Things get complicated for ECPR if RR #1 is earning more contribution

³⁴³ Beshers, "Efficient Access Pricing," 8.

from the customer than is required for revenue adequacy, and/or if there are more customers on the segment.

Development of ECPR and resulting criticisms. Appendix III reviews the development of the ECPR and potential advocacy to U.S. railroads. In brief:

- ECPR was first referred to (1983) as the parity principle by W.J. Baumol.
- The ECPR access price must cover:
 - All the variable costs incurred by RR #1 to provide trackage rights service to RR #2;³⁴⁴
 - Contribute enough to RR #1 for replacement of the incremental capital used in the process, where these costs are valued at replacement cost, not historical cost.
 - Contribute a fair return on RR #1's capital costs;
 - Compensate RR #1 for any net earnings which it must forego as a result of the tenant's use of trackage rights.
- The ECPR is viewed as being cost based and simpler than Ramsey pricing, which would, in principle, require knowledge of all demand elasticities.
- One method for determining the ECPR access rate is relatively simple: Take the current rate paid by the shipper to the incumbent railroad. Subtract the long run variable costs of the movement on the incumbent railroad. Add any new incremental costs that the incumbent railroad would have to bear to accommodate access by a competing railway that is authorized to use the track of the incumbent. The result would be the ECPR access rate. This method does not involve computing the common costs of the incumbent railway, nor the contribution from other traffic that uses the same track. It is much simpler than the standalone cost method.
- However, ECPR can perpetuate the unreasonable exercise of market power by the incumbent carrier.³⁴⁵ If the existing contribution by the shipper to RR #1 embodies an unreasonably high contribution to the latter's common costs, the ECPR access rate will embody the contribution rather than reducing it. The ECPR approach assumes that the existing contribution is no more than a reasonable contribution. Thus, ECPR, by itself, does not protect a shipper against unreasonable rates. The ECPR access rate merely enables competition on the A to B portion of the shipment, while preserving any potential unreasonable compensation on the B to C segment.

³⁴⁴ Other mechanisms of shared access, such as haulage or reciprocal switching, may also be deployed, and appropriate variable costs must be included.

³⁴⁵ See, for example, Kahn and Taylor, "Pricing of Inputs Sold to Competitors," 230.

- Some researchers recognize the potential of an ECPR access rate to protect an incumbent carrier's opportunity cost (the contribution to common costs), while at the same time it can enable competition for the shipper.³⁴⁶

M-ECPR. A 1996 paper advanced the concept of a “market determined efficient pricing rule” (M-ECPR).³⁴⁷ This could be used where there is an existing or a potential alternative to using RR #1. This might be, for example,

- An intermodal movement or an indirect railroad routing from A to C.
- However, it could also be a potential new market alternative, such as RR #2 building-in a new line from B to C.
 - This introduces a hypothetical railroad concept, similar to SAC.
 - The M-ECPR in this case would estimate the A to C rate, including both RR #2 price for A to B plus the costs of the build-in from B to C. This would be used to reverse engineer an access charge to be paid to RR #1 on B to C; The M-ECPR starts to embrace concepts of SAC, including specifying a hypothetical railroad line, estimating future costs and requiring coverage of the total costs of the hypothetical railroad line.

FCC rejection of ECPR/M-ECPR, acceptance in New Zealand. The FCC considered, but rejected, use of ECPR for setting access prices in the telecommunications industry, because ECPR enables incumbent carriers to recover their full opportunity costs, including any monopoly profits.³⁴⁸ Critics argued that “the FCC’s arguments hold equally for the M-ECPR.”³⁴⁹ In a different jurisdiction with different legislation, the High Court of New Zealand supported use of ECPR for pricing access to bottleneck network components. This was later reversed by New Zealand’s Court of Appeal because ECPR would include “monopoly profit in the opportunity-cost component of the access charge.” That second ruling was reversed and ECPR revalidated with a subsequent decision by the Privy Council.³⁵⁰

Summary commentary. The key points of the ECPR methodology are that it is intended to preserve the revenue adequacy of the incumbent carrier while potentially injecting actual competition or a meaningful threat of competition for a shipper’s traffic. However, the ECPR methodology could embody continuation of the earning of unreasonable contributions by the incumbent railroad and thus not offer the shipper the full range of competitive opportunities. A maximum rate reasonableness methodology such as SAC may be needed to make a rate reasonableness assessment for ECPR access charges.

³⁴⁶ For example, Armstrong, Mark, Chris Doyle and John Vickers, *The Access Pricing Problem: A Synthesis*, 44 J. of Indus. Econ. 149 (1996); Dewenter, Ralf and Haucap, Justus, editors, *Access Pricing—Theory and Practice* (Amsterdam: Elsevier, Amsterdam, 2007).

³⁴⁷ Sidak and Spulber, *The Tragedy of the Telecommons*.

³⁴⁸ Proposed Rule, *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, 61 Fed. Reg. 18,311, para. 147 (April 25, 1996): <https://www.gpo.gov/fdsys/pkg/FR-1996-04-25/pdf/96-10128.pdf>.

³⁴⁹ Economides, Nicholas, "The tragic inefficiency of M-ECPR," New York University, Center for Law and Business, Working Paper 98-003 (1997): 151.

³⁵⁰ Sidak, J. Gregory, and William J. Baumol, *The Pricing of Inputs Sold to Competitors: Rejoinder and Epilogue*, 12 Yale J. on Regulation 180-181 (1995).

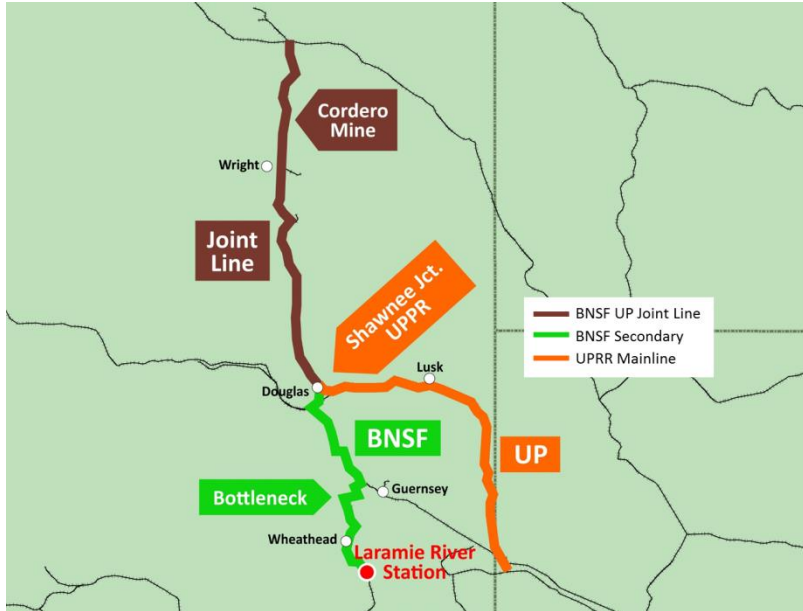
7.8 Using URCS Data to Illustrate ECPR Access Pricing for Two Cases

To illustrate the ECPR method, the *WFA* and *Otter Tail* cases discussed in the earlier chapters on SAC, Simplified-SAC, and TELRIC are used. The two cases were discussed in Chapter 5, both of which involved unit train coal originated on the Joint Line in Wyoming. The ECPR methodology involves subtracting the variable costs of the incumbent carrier from the actual rate. It is emphasized that our computations are hypothetical for purposes of illustrating the methodology. Actual computations in an actual access rate determination may differ.

Western Fuels. In this case, BNSF is the incumbent carrier, and UP is hypothesized as a potential competing carrier that would need track access rights on BNSF to complete the move.³⁵¹ This analysis assumes BNSF would perform a haulage service for the bottleneck segment, and BNSF thus would be compensated for two products: (1) access to its track plus (2) its variable costs of haulage. **Figure 7-5** illustrates existing and proposed routings. Computations for the analysis are summarized in **Figure 7-6**. The project team used URCS data to estimate variable costs.

³⁵¹ The hypothesized competing route for the *WFA* case makes use of Union Pacific's ability to compete for Joint Line coal originations at the Cordero Mine. A UP unit train would travel 96 miles on the Joint Line and be given to the BNSF to terminate under a haulage agreement.

Figure 7-5: Alternative Routings for WFA Traffic on Incumbent (BNSF) and Hypothetical Entrant (UP)



Source: Inter VISTAS, using data from DeskMap Systems, Inc. 2004. Professional railroad atlas of North America: United States, Canada, Mexico. 1st ed. Austin, TX: DeskMap Systems, Inc.

Figure 7-6: Computation of ECPR Access Charge for WFA Case (\$ per Trainload)

	Computation of BNSF contribution	Computation of ECPR access rate	Potential Shipper rate under haulage
Incumbent carrier Price per Trainload	\$106,725		
Subtract estimated BNSF Operating Cost A-C (ORL, DRL and ROI)	21,794		
BNSF Contribution A-C	84,931	\$84,931	
Incremental costs incurred by BNSF when it provides access: Charge for haulage from B to C (ORL, DRL and ROI)		8,214	
Access charge		93,145	\$93,145
UP Operating Cost A-B (ORL, DRL and ROI), estimated using URCS			16,027
Shipper cost			\$109,172

Source: Inter VISTAS calculations based on URCS data and public filings.

The ECPR methodology sets the access charge as the contribution currently earned by the incumbent railroad, plus any incremental costs incurred by the latter under the access regime. In this hypothetical example, there would be haulage costs, assuming the access regime is one where the incumbent carrier is required to haul the competitor's traffic on the bottleneck route segment that only the incumbent serves. Some observations can be made:

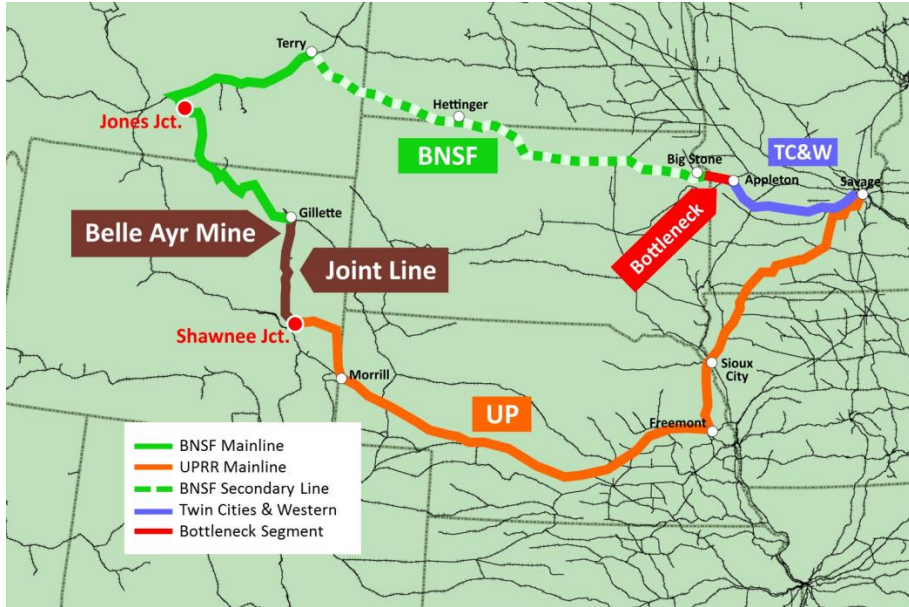
- In this hypothetical case, the variable costs are low resulting in the ECPR access charge embodying a relatively high contribution that is currently earned by the incumbent carrier. The ECPR access charge preserves the contribution (or potential over contribution) to revenue adequacy of the incumbent.
- The hypothetical case provides no margin for the competitive carrier.
- Even so, because of the high access charge, the resulting rate to the shipper is higher than the existing rate.

While our computations are hypothetical we note that in the *Western Fuels* decision, the STB ruled that the incumbent's rates were unreasonable.³⁵² The Full-SAC methodology thus found the existing rates embodied unreasonable exercise of market power. The ECPR access rate would have preserved that unreasonable market power, highlighting the key problem of ECPR as an access price methodology.

Otter Tail. A hypothetical competitive routing for Otter Tail Power is conceptualized consisting of 1,230 total miles with 1,046 of those on UP mainlines and 184 on the regional railroad Twin Cities & Western (TC&W), the last 24 miles of which would be over BNSF using existing (what were then) trackage rights. While the competing route is longer than that of the incumbent (See Figure 7-7), it was judged to be potentially feasible as the competitive route was over Union Pacific's principal mainlines where speed and density would be optimized, whereas half of the BNSF route is over secondary lines (formerly part of the Milwaukee Road). **Figure 7-7** illustrates the existing and potential routings.

³⁵² There are subtleties due to how variable costs can be computed, but in rough terms the Revenue to Variable Cost ratio of the disputed rates was around 447% percent (InterVISTAS computation). BNSF estimated R/VC as 326% whereas WFA estimated R/VC as 482%. The STB decision had R/VC that varies over 20 years in a range of 230% to 269%.

Figure 7-7: Alternative Routings for Otter Tail Traffic on Incumbent (BNSF) and Hypothetical Entrant (UP)



Source: InterVISTAS, using data from DeskMap Systems, Inc. 2004. Professional railroad atlas of North America: United States, Canada, Mexico. 1st ed. Austin, TX: DeskMap Systems, Inc.

Figure 7-8 summarizes the illustrative computations. The project team used URCS data to estimate the variable costs. This example has higher variable costs relative to revenue than the *WFA* example. Also in this case, the price the shipper is hypothesized to pay, even with no contribution being earned by the competing carrier, is higher than the existing disputed rate price. In the *Otter Tail* decision, the STB ruled that the BNSF rates were not unreasonable, so perhaps it is not surprising that the rate with an access regime using a longer routing would be higher than the access rate.

Figure 7-8: Computation of ECPR Access Charge for Otter Tail Power Case (\$ per Trainload)

	Computation of BNSF contribution	Computation of ECPR access rate	Potential Shipper rate under haulage
Incumbent carrier Price per Trainload	\$192,602		
Subtract estimated BNSF Operating Cost A-C	-66,615		
BNSF Contribution A-C	125,447	\$125,447	
Incremental costs incurred by BNSF when it provides access:		1,761	
Access charge		127,238	\$127,238
UP + TCW Operating Cost A-C, estimated using URCS			93,981
Shipper cost			221,219

Source: Inter VISTAS calculations based on URCS data and public filings.

7.9 How M-ECPR Might be Applied to Maximum Shipper Rates for US Freight Rail

This report is focused on alternatives for maximum rate regulation under ICCTA of the rates paid by shippers to railroads. The previous section discussed the concept of ECPR, which is a regulatory method for establishing access prices, not rates paid by shippers. A problem with ECPR is that while it is much simpler to compute relative to Full-SAC or Simplified-SAC, it has potential to embody existing unreasonable exercise of market power by the incumbent railway. Thus, SAC may still need to be used to test the reasonableness of the ECPR access rate.

M-ECPR is a related method for computing access prices when there are market alternatives. Since the carrier is presumed to be market dominant, a requirement of the Staggers Act continued in ICCTA, we presume this to mean that there is no railroad alternative for the shipper – but there might be other market alternatives such as a rail/truck alternate (e.g., a railroad offering a rate for movement to a reload center and trucking to destination) or rail/barge rate.³⁵³

Another possibility could involve a hypothetical computation where the costs of a short build-in by a competing railroad to the destination point. Using **Figure 7-4**, the M-ECPR starting point for developing a competitive rate would include a competitive railroad rate for transportation by RR #2 from A to B, plus the costs of a hypothetical build-in of RR #2 for a line from B to C. Like Full-SAC, this would still involve computing the capital and common costs of a hypothetical rail line, but only for a portion of the total shipping distance. If the build-in only requires a relatively short distance, then the computations might be

³⁵³ This would also apply when it is the origin that is not online to the competing railroad.

much simpler than Full-SAC. The computations would also be simpler than Full-SAC, because there is no allowance for contribution from other traffic on the short build-in segment.³⁵⁴ The rate for transportation by RR #2 from A- to C would be equal to its charge for the competitive segment from A to B plus the M-ECPR-determined build-in cost.

Put simply, an alternative to Full-SAC could be to use a multi-modal market shipper rate, or to compute a hypothetical shipper rate using a rate quoted by a competing carrier to the bottleneck point, and add the hypothetical cost for the competing carrier to build in to the destination.

M-ECPR method 1: Multi-modal shipper rate. The first of these alternatives could be quite simple. The current Full-SAC (as well as Simplified-SAC) involves estimating the costs of full origin to destination *single mode (rail only)* movement. If a shipper can obtain a quote from a competing rail carrier for an origin-destination movement using the competing rail carrier for most of the distance and a truck movement for part of the distance, then that multi-modal rate becomes the M-ECPR shipper rate.

There is no need for the shipper to have a single quote for the traffic. M-ECPR would accept a rate which adds a rail rate on a competing railroad from A to B and a trucking (or barge) rate from B to C, plus the costs of handling at B to change modes (referring again to the segments shown in **Figure 7-4**).

While this method is much simpler than Full-SAC or Simplified-SAC, there are limitations:

- The multi-modal rates for many commodities, especially but not confined to coal, are likely to be very high and not suitable as a maximum rate methodology for such cases.³⁵⁵
- The shipper may be unable to obtain a rate quote from a competing carrier for the movement from A to B. If the competing carrier perceives that there is little prospect of winning the traffic and its role is merely to enable a regulated maximum rate on another carrier it may decide to not cooperate. We note that in Canada, the need for a shipper to obtain a partial distance rate on a competing carrier has been problematic according to some shippers, with carriers not being willing to quote such rates. On the other hand, game theorists might view that a competing carrier would be motivated to quote low rates for such traffic in order to reduce revenue to a competing carrier.

M-ECPR method 2: Build-in rates. Like M-ECPR method 1, this method would require a rate quote from a competing carrier for the A to B segment in **Figure 7-4**. It then would require computation of the costs

³⁵⁴ Making allowance for contribution from other traffic would violate a key tenet of ECPR, which is to keep the incumbent railroad revenue adequate without raising rates on its other shippers. The ECPR access rate does this tautologically. The M-ECPR rate could leave the incumbent railroad worse off financially, but without the need to increase charges on other shippers since the resulting compensation to the incumbent is based on a competitive rate that includes the fixed and common costs needed. In other words, the M-ECPR access charge would squeeze out any unreasonable contribution currently reaped by the incumbent railroad, but providing an adequate contribution.

³⁵⁵ There are some cases of heavy haul multimodal movements using rail/truck. For example, BNSF has moved Alaska zinc concentrate from Vancouver to Trail BC using a rail movement for most of the distance and trucking for few miles from the railhead to the smelter. CP Rail is able to move the traffic on-line, although both carriers require use of interswitching on CN at the origin point. While on-line, the CP Rail distance is longer.

for a hypothetical build-in of a (presumably) short line from B to C. This exercise would be similar to parts of the SAC methodology in that the capital and operating costs of the B to C segment would need to be computed and then converted to an annual rate supplement (supplemental to the A to B rate). Like SAC, there would be contentious issues regarding the potential route, although presumably this would be less onerous since it involves only a portion of the total shipment distance. As indicated earlier there would be no need to estimate contribution from other traffic on the short build-in segment.³⁵⁶ The regulated maximum rate to be paid by the shipper from A to C would then become the sum of the competitive rate from A to B from another carrier, plus the annualized amount of the build-in cost from B to C.

Some disadvantages of this method are:

- The build-in rates require a competitive rate from A to B. Competing carriers may be unwilling to provide such a rate, or alternatively might 'game' such a rate to reduce revenues to a competitor.
- The method requires an exercise not dissimilar to SAC to estimate the cost of build-in and annualizing such costs to construct the rate.

An alternative that might be considered is for the STB to merely establish a rate from B to C on the incumbent railroad, and leave the shipper to find a suitable rate (from the incumbent or a competing carrier) on the A to B segment. This becomes a regulated interline rate. It is not dissimilar conceptually (although not computationally) to the Competitive Line Rate regulatory provision in Canada. The Canada Transportation Agency establishes a B to C rate on the incumbent carrier which the shipper then combines with a competitive A to B rate.³⁵⁷ This provision is seldom used in Canada.

7.10 Illustrative Example of an M-ECPR Method 2 (Build-in) Regulated Rate

Gainesville Regional Utilities. To illustrate the concept of the M-ECPR, method 2 (build-in) regulated rate, a 1990 example is used where Gainesville Regional Utilities (GRU) in Florida threatened to build a 21-mile spur to connect with Norfolk Southern Railway.³⁵⁸ **Figure 7-9** illustrates the existing route on CSX, and shows an alternative using Norfolk Southern to Lake Butler, FL, and then the 21-mile spur for delivery. NS is able to get close to the final destination but the final gap prevents it from offering service.

GRU opened discussions with NS and completed certain advanced work on the capital and operating costs of a build-out, including purchasing right of way, completing wetlands surveys, submitting permitting applications for construction design, and other matters. It appeared that the utility and the competing carrier were willing to commit to the build-in, but the incumbent carrier offered a lower rate that satisfied

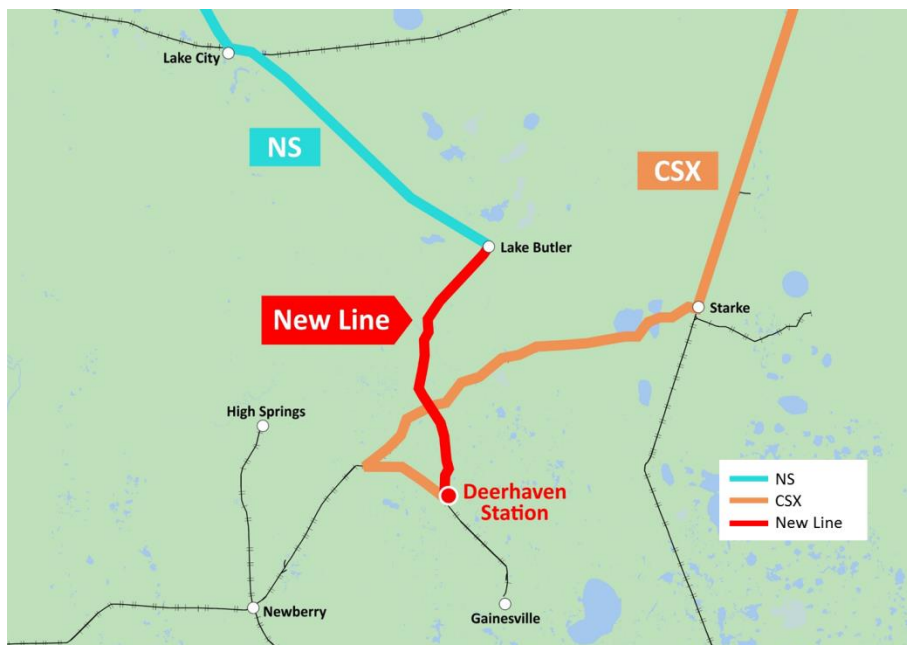
³⁵⁶ The ECPR principles would preclude diverting other revenue from the incumbent shipper; hence no contribution from other traffic would be appropriate if such traffic would be diverted from the incumbent. If there was totally new traffic, perhaps diverted from another mode, then contribution from such traffic could be considered by the M-ECPR methodology.

³⁵⁷ There are a number of subtleties to the CLR provisions in Canada which are not covered here, where only a conceptual discussion is being provided.

³⁵⁸ This case is discussed in Brandenburger, Adam M. and Barry J. Nalebuff, *Co-Opetition* (New York: Crown Business, 2011) 76-80.

GRU. In this instance, the threat to CSX’s market dominance of the traffic resulted in the carrier reducing GRU’s rate by nearly 24 percent. This was estimated to cost CSX a present value of \$34 million over the life of the contract,³⁵⁹ but CSX prevented the build-in and preserved some contribution to fixed costs. Notably, CSX argued it would have had little reason to continue operating and maintaining the line to GRU’s Deerhaven Generating Station if the build-in occurred, and thus if the utility constructed the build in and moved the traffic to NS, the line would have been abandoned.³⁶⁰ In this case, it appears that threat of the build in resulted in a reduced shipper rate but preserved a contribution to the carrier’s costs sufficient to prevent line discontinuance. However it should perhaps also be noted that the market worked out a solution without the need for maximum rate regulation. The case would have involved the need to use another regulatory provision, an authorization to build-in a new 21 mile rail line, as well as various environmental hurdles, but it did not need regulatory rate intervention to obtain a lower rate for the GRU.

Figure 7-9: Threatened Build-Out by Gainesville Regional Utilities



Source: Inter VISTAS, using data from Brandenburger, Adam M., and Barry J. Nalebuff. Co-opetition. Crown Business, 2011, and DeskMap Systems, Inc. 2004. Professional railroad atlas of North America: United States, Canada, Mexico. 1st ed. Austin, TX: DeskMap Systems, Inc.

³⁵⁹ Ibid.

³⁶⁰ Ibid.

8 Summary and Conclusions

8.1 Context

The regulatory reform of the U.S. railway industry in the 1970s-1980s was a dramatic development, not only in the economics of the railroad industry in the U.S., but also more generally. Often attributed to the Staggers Rail Act of 1980, rail regulatory reform began earlier with the 3R Act (Regional Rail Reorganization Act of 1973), followed by the 4R Act (Regulatory Reform and Revitalization Act of 1976). Collectively, these pieces of legislation set the stage for a dramatic recovery of the financial health of the U.S. railroad industry, an equally dramatic reduction in real rates paid by shippers, and improvements in the level of service offered.

At the core of the 1976-1980 regulatory reform was deregulation of rail rates where competitive forces of various types would generally be sufficient to constrain carriers' market power. It was recognized that there were various types of competition acting upon rail carriers, including competition from other rail carriers and competition from other modes (primarily truck, barge and pipeline). The deregulated regime generally allows carriers and shippers to reach mutually agreed rates without any need for regulatory oversight.

At the same time, Congress recognized that not all shipments would have market conditions that could constrain potential undue exercise of market power by rail carriers, and it made provision for regulation of rail rates in such cases. The new regulatory provisions had a number of important dimensions. Among these were:

- Regulation would not be ex ante, but rather would originate upon complaint of the shipper.
- Market dominance of the carrier would need to be established for the specific traffic in dispute.
- A cost-based threshold (180% of URCS variable costs) would be established, under which rates would be conclusively presumed to not be unreasonable.
- An ability to designate certain types of commodities or shipment types as facing sufficiently competitive conditions that they could be exempted from regulatory review.

By themselves, these provisions positively changed the regulatory dynamic of shipping products by rail for a large portion of shipments, and for many shipments ended what had been a rate regulation process sometimes lasting a decade.

In implementing the post-Staggers regulatory regime, the primary rate regulation methodology utilized by the ICC and now the STB is the Stand Alone Cost (SAC) test. It is part of a general regulatory approach referred to as Constrained Market Pricing (CMP), discussed in Section 2.4 and Chapter 4. The SAC methodology has at its core the concept that the shipper should never pay more than it would cost to self-provide the rail services it needs. However, the methodology does not naively assume that there would be no other traffic contributing to the fixed and variable costs of operating the rail service. Instead, the methodology recognizes that there can be revenues and resulting contributions above variable costs from other traffic that would use the shipper's rail operation. But this contribution is confined to traffic that

would use the line needed by the complaining shipper. The methodology does not allow cross subsidy of the shipper's operation from other parts of the network not used by the shipper.

Within the framework of CMP, the STB has complemented the Full-SAC test with both a Simplified-SAC process and for even smaller shipments the Three-Benchmark test, based on comparing the contested rate against the rates paid by comparable traffic and the financial need of the carrier.

Over time, however, the STB has become increasingly concerned about the high costs and other difficulties that shippers face in bringing complaints for rate relief from the STB. Thirty-five years after the Staggers Act, when the financial condition of the rail industry was abysmal, U.S. Class I railroads are now generally profitable. Shippers have raised concerns about whether the regulatory structure established by the STB, even with the introduction of the Three-Benchmark and Simplified-SAC alternatives, now fairly balances their interests in reasonable rates and services against the goal of helping the carriers return to financial stability and viability. This report is part of its examination of the STB's methodologies and procedures for rate relief complaints.

8.2 Objectives of the Study

Against this broad backdrop, the STB sought an independent assessment of its approach to reviewing rail rate reasonableness. The STB initiated this study to examine the academic and scholarly literature that addresses proposed alternatives to all or part of the STB's current rate regulation methodologies. The general research questions that this report sought to answer were:

- What methodologies do other national regulatory agencies apply to examine the reasonableness of rates levied by railroads, utilities, natural monopolies, or other network industries, and are any of those approaches suitable for the STB's purposes, given its statutory responsibilities and limitations?
- Is SAC still a valid instrument to determine the reasonableness of rates?
- Can that procedure be simplified?

8.3 Review of Regulatory Methods Applied to Network Industries

The project team analyzed a large body of literature and practices of rail regulators in other countries to identify potential alternative methodologies to the existing maximum rate regulation used in the U.S. rail industry. The literature review encompassed economics, business and law journals and books to identify relevant material to provide the STB with detailed recommendations on potential alternative rate regulation approaches and methodologies. As well, we looked at regulatory documents in other countries and in other regulated sectors. The team organized the literature review by category to cover a wide range of rate regulation aspects.

- The first category of papers analyzed dealt with the theoretical foundation of the concepts of Ramsey-Boiteux prices, cross-subsidization, rate reasonableness and the stand-alone cost test. This category encompassed the original work of Marcel Boiteux, Gerald R. Faulhaber, William J. Baumol, and Robert D. Willig and subsequent publications related to these concepts.
- The second category of papers described the existing rail regulatory regimes in other countries and identified the use of the SAC concepts by rail regulators in other jurisdictions. While

European rail regulation is mainly passenger-oriented, the team identified some relevant experiences with freight rail in the UK and in Australia. These countries have applied a similar concept to stand-alone cost in their respective rail industries. The regulatory context differs from the U.S. industry, as the rail industry in these countries is regulated by an open access regime. Canada uses a final offer arbitration procedure to constrain potential exercise of market power in lieu of regulation, and because reasons for decisions are not provided by the arbitrator we make no inference.

- A third category of papers deals with rate regulation used in other industries such as electric utilities, natural gas and telecommunications. These industries have largely adopted access regimes to constrain rates paid by end users, and the regulatory process focuses not on end rates paid by customers but on rates paid by independent competing service providers for access to the network facilities of another service provider. The railroad equivalent would be a regulatory system governing the rates paid by one operating railroad to another railroad whose track is used, and not the rates paid by the shipper to operating railway. Regulatory approaches in these industries are often very specific. For example the telecommunication industry developed the concept of Total Element Long Run Incremental Cost (TELRIC) to determine the rates to access the network.

Theoretical Foundations

Ramsey Pricing. 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.³⁶¹ None of the papers we analyzed propose changing this fundamental view. At the same time, however, there is general agreement that determining Ramsey prices are difficult because the pricing entity must solve for all of the prices the railroad charges or all the prices it charges on a particular line. The pricing entity would have to know the price elasticity of demand of other products and shippers as well as the marginal costs to serve these products. Such information is generally not disclosed by the industry and needs to be estimated based on statistical analysis of different sources of information. Doing so would be a challenging exercise.

Stand-Alone Cost. The stand-alone cost (SAC) is a maximum rate that should not be exceeded. The price the railroads charge could be lower than this amount, but in no case should it exceed this amount. There are two ways to view the SAC test.

One is to view the SAC test as a proxy for the Ramsey prices. Indeed, a price ceiling that may be proposed for a service is one based on the Ramsey pricing principles (i.e., prices that maximize the economic welfare from railroad services when firms cannot charge at marginal cost – because they would be non-compensatory-- as it is the case in the railroad industry) and are based on a mark-up inversely

³⁶¹ Ramsey pricing allows the service provider to charge differential rates to different shippers, based in part on their willingness to pay (but always covering all variable costs), but constraining the railroad to no more than covering its total costs (including fixed costs and a reasonable return on invested capital). Conceptually, the set of Ramsey prices (railroad rates) are the ones that maximizes the economic value of rail services to shippers, and hence the nation, without subsidizing the rail carrier.

proportionate to the elasticity of demand.³⁶² Because the SAC test, as implemented by the STB, considers contribution from other shippers to line fixed costs, it is “Ramsey-like”.

A second way to view the test is to conceptualize the SAC independently from Ramsey prices and simply say that no shipper should ever pay a price higher than the one it would incur if it had to build and operate its own (efficient) railroad. The origin of this approach can be found in Faulhaber’s concept of stand-alone cost. Faulhaber defined the stand-alone cost of a service or of a group of services as the minimum amount per unit it would cost to provide the service or group of services if it were offered by a single-product supplier.

Implications of Revenue Adequacy. Achieving Enterprise Level Revenue Adequacy (ELRA) by the U.S. railroads does not necessarily mean the SAC test needs to change. Baumol and Willig anticipated this condition; they said that the revenue adequacy of railroad does not change the stand-alone cost. That is partly true but there are some subtleties to that conclusion.

First, a railroad might be profitable, but may not be earning a market return on the replacement cost of the assets the railroad will need to maintain and replace to provide future service. The SAC test is based on providing revenue adequacy to an efficient railroad so that it earns a reasonable (but no more) return on their efficient assets, recognizing that replacement costs of actual track and equipment might be more (e.g., due to inflation and value appreciation) or less (e.g., replacement by more efficient technology) than historical book costs. Optimal economic decision-making should be based on current values of assets, not outdated values from perhaps decades ago. Shippers should not be expected to compensate railroads for overbuilding or overpaying in earlier years or for obsolete/stranded assets, nor should railroads be expected to provide efficient assets for shipper services at rates below what those assets can command in current markets.

Second, the Staggers Act made it easier for railroads to abandon individual lines that were uneconomic. In doing so, Congress indicated that valuation should be determined on a rail-line-specific basis and not on a network-system basis. This means that a railroad can be ELRA but still need to charge higher rates on a particular line to cover the specific costs of that line. Otherwise, shippers on some routes would need to cross-subsidize traffic on other routes. This would be to the detriment of those shippers and would reduce overall economic welfare. As a consequence, a shipper (e.g., a coal shipper) on a low traffic line may have to pay a very high rate on the line it uses even if the railroad makes some profit someplace else. Even if the railroad is making overall profit, shippers should make appropriate contributions to the costs of the line being used. Likewise, a railroad that is revenue inadequate at the enterprise level cannot defend charging rates that are higher than the SAC level on the ground that the shippers on the market-dominant segment should cross-subsidize the railroad’s other routes.

³⁶² The phrase “markup inversely proportionate to the elasticity of demand” is the economist’s way of saying that those with a higher ability to pay should pay more than shippers who can only tolerate small markups before either shipping products by another means or not shipping at all. It is the retention of such price sensitive shippers on the rail network that increases social welfare. And it is in the interest of a price-*insensitive* shipper to pay to retain the price *sensitive* shipper on the system. Any contribution from the latter to the railroad’s fixed costs reduces the rates that the former would pay.

Rail Regulation Applied by Other Countries

The project team reviewed the regulatory frameworks applied to freight rail in several other countries. These included the United Kingdom, Australia, and Canada. In general, these were not found to be particularly applicable to the STB's regulation of the U.S. rail industry because of unique characteristics or circumstances that were found in those nations.

- In Canada, rate relief is available via a commercial final offer arbitration process, in which the arbitrator selects either the rate offer of the shipper or the carrier, with no allowance for compromise. Because arbitration decisions are confidential and reasons for decision are not provided by the arbitrator, the Canadian regime provided no insight on the issue of the STB's use of the SAC criteria.
- The U.K. has a very different rail transport regime, where the track has been separated into a nationalized, government-owned infrastructure company and "above the rail" companies operate trains (freight or passenger) for their customers. There is no maximum rate regulation available to shippers. The regulator sets prices for access to the rail system. The nationalized track company in the U.K. is subsidized and its predecessor failed. The U.K. rail regulator did use stand-alone costing as a methodology for regulating track access charges, but dismissed it as the resulting charges far exceeded the subsidized rates that the track company used.
- Australia also has an access regime and shippers have no recourse to maximum rate regulation. There is a nationalized track company for the intercity network. Within states, there are vertically integrated (track and train) railways, but state regulators oversee rates for track access to other operators on the state tracks. In setting access charges, both federal and some state regulators have used stand alone cost as a methodology.

While both the U.K. and Australia have made some use of stand-alone costing, because these regimes subsidize track investments and have no regulatory provision for shippers to appeal rates, there are few lessons for shipper rate regulation in the U.S.

Regulatory Mechanisms Applied to Other Network Industries

The project team surveyed the regulatory approaches applied to other network industries, focusing on that used on electricity transmission and telecommunications. Some utilities are regulated via traditional rate-base rate-of-return or 'modern' price cap regulation. However, these are methodologies for setting (or limiting) all rates for all customers. As such, they are not appropriate for use in the U.S. railroad industry, where regulatory relief is intended as an exception, with market forces used for rates wherever possible.

Federal regulators of the telecommunications, electricity and natural gas transmission industries use some forms of access regulation. The Federal Energy Regulatory Commission (FERC) regulates the rates for electric transmission, wholesale sales, and related ancillary services in interstate commerce, principally under the Federal Power Act. It also regulates the rates for interstate natural gas pipeline, storage and related services under similar provisions of the Natural Gas Act.

The Federal Communications Commission (FCC) regulates the U.S. telecommunications industry. The mandate given by the Congress to the FCC is fundamentally different from that given to the STB: facilitate competition at the retail level. In contrast to the Staggers Act, little regard was given to

promoting the industry's financial health. Unlike the railroad industry in the 1970s when regulatory reform legislation was enacted, the major telecommunications companies were not financially challenged. Thus, telecommunications reform legislation is focused on promoting competition, with little weight given to revenue adequacy. To make its access regime work, the FCC developed a methodology, TELRIC, for determining access prices that would promote entry, even if non-compensatory to the host network owner.

TELRIC is not suitable for US freight rail. To begin with, it is a methodology for access rates not for shipper rates. The shipper would lose the ability to complain about a carrier's rate and seek regulatory relief. TELRIC is motivated solely by injecting competition into existing networks and is not guided by a legislative revenue adequacy concern. This was perhaps justifiable when the telecommunications was 'deregulated' as the existing telecoms had high rates of return, but railroads have a history of revenue inadequacy, and revenue inadequacy could become a major concern for US freight railroads in such a regime. TELRIC provides no guidance as to what specific cost allocation methodology should be used and the investigation showed that the even simple cost allocation methodologies such as a common percent markup to contribute to fixed costs, or markups based on the shipper's traffic shares of tons or revenues (revenue shares involve some circular reasoning) give wildly different results. Because the TELRIC method provides no guidance between these alternative cost allocation methods, is not concerned with revenue adequacy, and is an access charge and not a shipper charge, we find no basis substitute TELRIC for CMP for assessing whether a rail carrier's rates are unreasonable. In light of these deficiencies, TELRIC would still be an unacceptable methodology, even if Congress decided to radically transform rail regulation by enabling widespread access, with or without separation of track from train operations.

8.4 Is the SAC Test Still Valid?

There have been a number of criticisms about the appropriateness of the STB's stand-alone cost test as a rate ceiling in the U.S. rail industry.

The SAC concept might be said to have begun with Faulhaber's 1975 work on cross-subsidies. Faulhaber showed that under specific conditions (a natural monopoly situation, economies of joint production, zero profit constraint, and no cross-elasticities), the price of providing a set of services to a group of customers is lower than the cost of providing each service individually. The stand-alone cost is then the upper limit above which each individual has an incentive to provide the service itself. Below the stand-alone cost, there is no incentive for a particular customer to break the joint economy and to go it alone because the benefits of the joint economy are redistributed to each customer in the form of lower rates. Faulhaber's work was refined and advanced by several papers in the 1970s and 1980s, including most notably in 1982 by Baumol, Panzar and Willig in *Contestable Markets and the Theory of Industry Structure*. In this book, the authors showed that in a monopolistic situation, the multi-product incumbent is constrained in its pricing by the threat of competitor entry. This became the theory of contestable markets.

Baumol and Willig further articulated these concepts in the context of the U.S. rail industry. Their 1983 paper aimed to provide sound economic principles behind the regulation of rate setting in the case of unsubsidized railroads (i.e., railroads that needed to achieve revenue adequacy on a line based solely on rates charged to shippers). The authors demonstrated that there are economic principles that promote economic efficiency and ensure rail carriers can earn adequate revenues when traffic is subject to

competition in the railroad industry experiencing economies of density. These principles lead to Ramsey pricing.

Faulhaber subsequently criticized the SAC test, arguing that the original concept was based on the assumption that the firm is a profit constrained firm with economies of scale and scope and that the benefits of these economies was being shared between the individual services served by the firm. Thus, the measure of the SAC for an isolated piece of rail line (the Stand Alone Railroad) would not take into account the fact that a line is part of a bigger network and hence that the cost for operating that line as part of a large network may be lower because of economies of scope with the other lines.

In rebuttal, Willig argued that Faulhaber was incorrect because the SAC test actually accounts for the economies of scope through the revenue contribution from the cross-over traffic.

Having reviewed Faulhaber's argument and the Willig response, the project team believes that Faulhaber may have raised a point not considered by Willig. Effectively the bridge traffic contribution is a contribution to the fixed costs of the stand Alone Railroad (SARR). This *is* an economy of scope benefit. But the issue being raised by Faulhaber is whether the marginal cost (the long run variable cost) of the SARR is lower in the context of a network larger than the SARR. In general, practitioner cost functions (such as URCS) have equations which have factors that allow costs to be lower at higher traffic volumes, but they do not have factors that shift the cost relationship down due to the overall network being larger and more efficient. Econometric enterprise level cost functions that allowed such relationships appeared in the academic literature in the 1970s and 1980s. That is, there were second order interaction terms between the network size (and investment in network) and the other factors of production. Unfortunately, such cost functions are not useful for estimating variable costs of specific traffic movements. A review of the cost function results from the literature found ambiguous results in this regard. The second order interaction terms between network size and the other production function (or cost function) terms found both insignificant coefficients in many cases, or results that were not robust and changed (e.g., changed sign or magnitude) in different specifications.

We reach the following conclusions in this regard.

- First, the existing stand-alone cost methodology does recognize economies of scope with respect to total costs via the contribution of bridge traffic to the fixed costs of the SARR.
- Second, conceptually there could be an additional economies-of-scope effect in reducing the marginal/variable costs of the traffic in dispute. The STB's guidance on SAC submissions allows, and even encourages shippers to consider such economies.
- Third, at least one observer has recommended that the SAC methodology should allow shippers to reflect economies of scope between the SARR and all the other lines in the carrier's network, even if in different regions. This is not a recipe for simplification of the SAC methodology, quite the opposite. It also seems to be at odds with the current provisions for line rationalization and abandonment originally added by the Staggers Act. By allowing rail carriers to abandon uneconomic rail lines, these provisions imply a policy that requires rail lines to stand on their own financially; thus introducing revenue contribution from other lines seems inconsistent with the legislative provisions.

8.5 Testing Two Variants of CMP and an Alternative Methodology, ECPR

This report attempted to examine whether greater use by shippers of Simplified SAC or the Three-Benchmark method would yield fundamentally different or similar outcomes to those produced by the more expensive and time-consuming Full-SAC method. Also considered was a variant of an access pricing regime known by the acronym ECPR. This study applied the four different regulatory schemes (SAC, Simplified SAC, Three-Benchmark, ECPR variant) to two cases – *Western Fuels* and *Otter Tail* - to examine whether different approaches would yield the same general results, and to provide observations from those exercises.

The STB's CMP approach to assessing whether a contested rail rate should be deemed to reflect an undue exercise of market power allows three methodologies. The choice among these methodologies is left to the complainant:

- Full-SAC

For the shipment in question, a Stand Alone Railroad (SARR) is conceptualized, and the costs of providing service are estimated. This includes both the capital costs (track, rolling stock) and operating costs. Capital costs are based on current dollar replacement costs. This is to ensure that the most efficient means of providing the transportation service needed by the shipper is adopted. E.g., rather than use existing, potentially aged motive power units (locomotives) that are in a carrier's fleet, the SARR would envision using modern, efficient power units. These would be valued at current cost as the exercise will estimate the cost of providing service in the long term and this contemplates new equipment that will be employed in service over that span of time.

Two key questions arise in the SAC methodology. The first is the routing for the traffic. In the early days following the Staggers Act, the industry was fragmented into more than forty Class I railroads and the carrier hauling the shipper's traffic often was using indirect routings. SAC allows the shipper to define a more efficient routing that would result in lower long term total costs (capital and operating costs) than might be the case for the actual routing. This exercise can be cumbersome and requires considerable analysis to define the routing and estimate all the costs.

The second key question is what other traffic could utilize the SARR and thus contribute revenue that would offset the costs of building and operating the hypothetical rail system. The STB allows the complaining shipper considerable leeway in designing the SARR's route so that the shipper can propose a SARR with a somewhat longer or more indirect routing that can attract more potential traffic (and hence revenue). Note that these two key questions are interrelated – the routing of the SARR depends not only on the traffic of the complaining shipper, but also on the potential for capturing other traffic. Issues also arise as to how much revenue should be attributed to the SARR, as the other shipments typically would only use the SARR for a part of the shipments' journeys. More importantly, recent cases have seen attempts by shippers to define complex SARRs with extensive networks to maximize potential contribution from other traffic.

Netting the contribution from the other traffic from the total costs of the SARR thus left the costs that would need to be recovered from the complaining shipper's traffic. Discounted cash flow

analysis is used in setting the rate for the complaining shipper's traffic that just covers the total costs (including a reasonable return on capital) of the SARR. This is, of course, a rough generalization of the SAC methodology and there are a range of important issues (e.g., the appropriate cost of capital) to be determined.

- **Simplified-SAC**

To reduce costs to the shipper (and carrier and STB) of the regulatory methodology, Simplified-SAC makes the key simplification that the existing routing of the disputed traffic is to be used. No case has been heard to conclusion under this standard, as cases have been initiated and then settled. Another simplifying assumption is that the analysis is also confined to a single year, rather than the ten or more years required in Full-SAC.

- **Three-Benchmark**

Relief under this methodology is capped at \$4 million.

The Three-Benchmark method is part of the constrained market pricing program and like Full-SAC and Simplified-SAC is focused on determining the amount of revenue required for the railroad to cover its costs (including a reasonable return on capital) on the line used by the disputed traffic. The benchmarks are linked and two of them are determined annually by the STB for a given carrier. These focus on the mark-up above variable cost required by the railroad to cover its costs from potentially market dominant traffic (i.e., traffic with a revenue to variable cost, R/VC, ratio of 180% or higher). The third benchmark is specific to the traffic in dispute and is a comparable rates method, which determines the average R/VC for comparable traffic.

The Three-Benchmark method embraces the key concepts of Ramsey pricing contained in CMP. First, revenues are only to be enough to allow the railroad to be revenue adequate. Second, the use of the comparable rates benchmark embraces the concept of demand based differential pricing at the core of Ramsey pricing and CMP.

- **An ECPR alternative**

An alternative methodology that has been suggested for use in the rail industry is ECPR. This is a method for establishing an access price for another railroad to use the tracks of the incumbent carrier for part of the transportation route. ECPR is a much simpler methodology to compute, requiring only the existing rate and a measure of variable cost for the incumbent and entrant. While this establishes an access price, the report looked at how it might be used to estimate the full shipper rate. The report notes that this methodology, while easy to compute, is not a test of rate reasonableness, and thus may still require use of SAC or another CMP method.

Testing the alternative methodologies against Full SAC findings

Two past STB Full-SAC cases were selected to test the alternative methodologies. The examples showed that in one case where the complainant chose full SAC and the Board determined that the carrier

rates were unreasonable by a large magnitude (*Western Fuels*) the Simplified-SAC and Three-Benchmark methods likely would have reached the same conclusion.³⁶³ In another case (*Otter Tail*), where the STB did not find rates to be unreasonable, Simplified-SAC and Three-Benchmark likely would have resulted in the same conclusion. This may not always be the case. While the three methods all arise from the same key principles of CMP, the computational differences could lead to different results in more complex cases with subtleties.

These results support the choice that the STB currently offers the shipper between full SAC, Simplified SAC or Three-Benchmark, with the shipper deciding whether full SAC is worth the cost.

The ECPR computations for the same two cases resulted in shipper rates that would be as high as existing rates. This is because the ECPR method protects the revenue adequacy of the incumbent carrier by setting an access price for a competing carrier to the tracks of the incumbent that embodies the existing contribution that the shipper makes. Hence it should not be surprising that ECPR does not appear to offer rates lower than the shipper's existing rates. However, the report emphasized a criticism of ECPR, that it is not a test of rate reasonableness. While ECPR can easily establish an access price to the tracks of the incumbent carrier that protects the contribution to the fixed and common costs of the incumbent, the methodology may simply be maintaining any unreasonable exercise of market power by the incumbent.

8.6 Can the SAC Test Be Simplified?

8.6.1 On the Simplification and Modification of the Three-Benchmark Approach

The Three-Benchmark test is already relatively simple. The test compares the R/VC markup of the traffic at issue with the average markup of comparable traffic using Three-Benchmark measures. Shippers and the railroad only need to compute one of these benchmark measures – STB has already calculated the other two and made them publicly available.

Shippers and the railroads must first determine whether the rate at issue exceeds the jurisdictional threshold using the URCS costing program. Then, the shippers and the railroads have to estimate the average markup of a comparable group that the STB would have determined via final offer arbitration after each party has submitted its own comparable group. In practice, the only quantitative analysis required is the selection of the comparable traffic. The computation of the upper boundary of the R/VC is facilitated by using a template provided by STB's staff. With available analytical software able to run different simulations of comparable groups and rail expertise, such a task should be relatively simple for

³⁶³ Although the simplified methods adapted would have likely reached the same conclusions, the magnitude of the relief would likely not have been the same. The adapted Three-Benchmark method would result in a smaller rate relief amount than that found using the Full-SAC method (though there would still be rate relief). The results of the adapted Simplified-SAC method would have likely led to a similar magnitude of rate relief.

shippers. The cost of such an exercise is likely to be below the \$4 million relief limit the shipper can seek over a 5-years period.³⁶⁴

Further simplifications to the Three-Benchmark test would likely reduce its adherence to the CMP principles. The test was designed to embody the concept of CMP—that is, revenue adequacy and differential pricing within a range of reasonable prices capped by the stand-alone cost of providing an efficient service. Using the RSAM and the distribution of the markup on comparable traffic, the test effectively captures key characteristics of the CMP. Any additional simplification would, in our opinion, deviate further from these characteristics of CMP and would compromise the nature of the test and its adherence to the CMP principles.

Initial empirical analyses suggest that the Three-Benchmark test is consistent with Simplified-SAC and Full-SAC. One reason shippers appear to be reluctant to use the Three-Benchmark test may be the perceived inability of the test to capture unique characteristics that can be addressed by a Simplified-SAC or a Full-SAC test. However, the project team’s empirical analysis of two past cases indicates that the Three-Benchmark test results are consistent with the results of the Simplified-SAC and the Full-SAC test. Another reason why some may be reluctant to use the Three-Benchmark test is that the comparable rates are similar to those of the contested traffic, thus not justifying an application. However, this may also be an indication that the contested rate is consistent with market outcomes. The project team only analyzed two completed cases; further analysis might be necessary to confirm these initial results. However, this analysis indicates that the Three-Benchmark test is appropriate to provide some relief at lower cost. If shippers want to obtain a higher relief, or if they believe that other nuances concerning their shipments need to be captured to get a more precise result, they can choose the Simplified SAC or the Full-SAC test.

8.6.2 On the Simplification and Modification of Simplified-SAC

Further simplification of the Simplified SAC could undermine the reliability of the test. The Simplified-SAC is considered by some to be too complex and expensive, even though it is significantly simpler than Full SAC as described previously. Two aspects of Full-SAC that add a fair bit of complication (and hence cost) – the design of the railroad and the determination of cross-over traffic – have already been simplified in the current Simplified-SAC through requiring the use of the existing line and cross-over traffic. In the past, the Simplified-SAC test used a benchmark approach to estimate the RPI cost of a railroad. This approach was considered to provide inaccurate results. The STB thus decided to require a Full-RPI analysis for the simplified test and removed the limit on the relief. While shippers may want an approach simpler than the current Simplified-SAC, they may not be ready to make simplifications that compromise the accuracy of the test.

SAC is the only available test that allows the shippers to avoid cross-subsidization. One reason why the SAC test is considered to be complex and expensive is because it allows the shippers to benefit from the economies of scope in the network when determining the appropriate ceiling price. To our knowledge, this is the only procedure that allows shippers to obtain economy of scope benefits. With an

³⁶⁴ Presumably, a shipper would only want to pursue a rate complaint if the shipper’s cost of the proceeding is less than the potential benefit. Here, the key observation is that the cost of Three-Benchmark method is less than the cost of Simplified-SAC and thus more likely to elicit a complaint.

access regime such as those used in the freight railroad industry in Australia, the shippers would not have the opportunity to get such accurate measures. Worse, some of these regimes would allow cross-subsidization in the network by using uniform pricing approach or would set ceiling that do not take into account economies of scope and would therefore be higher than the SAC computed in the U.S. railroad rate cases. The avoidance of cross subsidy in rates paid by railway shippers is one of the key foundations of CMP and we are of the view that it should continue to be a core principle in rail rate reasonableness assessment.

Further simplification of Simplified SAC would not necessarily incent shippers to use it. Shippers would lose the accuracy of the SAC test. Simplification is only possible through a standardized approach of determining the SAC. A standardized model to estimate the RPI is unlikely to capture the specificities of each rate case. The current standardized cost system is for example criticized by shippers and the profession. Shippers are unlikely to use a standardized method that they know provides inaccurate results.

8.7 Are There Methodologies Other Than CMP that are Simpler?

- Rate-base rate-of-return regulation is neither simpler nor appropriate for the U.S. railroad industry.
- Price cap regulation conceptually can be simpler as it involves only periodic reviews and does not set individual prices. But in practice many price cap regulators have developed increasingly complicated, lengthy and expensive review processes. More important, price cap methodology generally would apply to all rates by the carrier and this is not appropriate for the U.S. railroad industry.
- TELRIC is an access price methodology. It is simpler, but it provides no specific guidance on how to allocate fixed/common costs to shipments. It is not consistent with achieving economic efficiency.
- ECPR is another access price methodology. It too is simpler to compute. However, it is not a methodology for assessing rate reasonableness and thus is not appropriate for use in maximum rate regulation of shipper rates.

The research has not pointed to a simpler methodology than the three CMP methods that assess 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.

Another question that could be raised is whether Full-SAC is worth the expense, time and effort. Our evaluation is that in general it is not, but there may be circumstances where it would be appropriate.

The most time-consuming and expensive elements of the Full-SAC are the definition of the route, the identification of potential cross-over traffic, and the assignment of revenue from such traffic. These are also the primary differences with Simplified-SAC. Prior to the consolidation of the railroad industry via mergers (and some railroad bankruptcies/failures) and the extensive rationalization of track and equipment assets, the route definition and cross-over traffic identification/quantification were important steps in CMP to ensure the shipper was not paying for assets and operating costs that were inefficient due to historical evolution of the rail network and asset base. As the decades passed, much of the

historical inefficiencies of the carriers have been addressed and either eliminated or substantially reduced in magnitude.

To us, the issue becomes one of whether Full-SAC will identify actual inefficiencies of significant magnitude to justify the cost of adjudication, or whether it merely creates opportunities to design indirect routes that seek opportunities to capture traffic that would not move over a more direct line. The latter option carries the potential of designing in new inefficiencies.

Our re-analysis of two settled cases suggests that the simpler methods led to the same outcome regarding whether the carrier's rate is unreasonable, at least for these two cases. We expect that when the difference is close between a rate that is reasonable versus one that may be unreasonable, the difference in outcome can be explained via the use of different methodologies. Where the difference is more decisive, it is likely that the methodologies will yield different results. In the former case, the shipper will have to weigh the cost of using the more thorough methodology. The existing but more complex methodology is still available.

We endorse the decision of the STB that no longer requires the use of Full-SAC and removes the limit on rate relief for the Simplified-SAC method. We recommend that the STB should ensure that when the shipper does choose the Full-SAC approach, the critical elements of identifying a more efficient route, relevant cross-over traffic and revenue assignment from the cross-over traffic reflect genuine inefficiencies in the existing operations and route.

9 Synopsis of Key Conclusions

Is the time and expense of Full-SAC justifiable?

- More so than was the case in the 1980s, the management efficiency constraint of CMP is embodied in a rationalized rail network and much more productive railroad operations. This supports increasing use of the Simplified-SAC rather than Full-SAC.
- Thus, our observation is that use of Full-SAC generally is difficult to justify, although it may be important in certain cases, where there are clear indications of management inefficiency. In such cases, the magnitude of revenue difference may more than offset the costs of the Full-SAC proceeding, especially when there are unique factors of the shipment or rail line that need to be fully considered.
- The research indicates that some large revenue cases could be done using the Simplified-SAC or Three-Benchmark methods. Our examples showed that in one case where the STB used Full-SAC and determined that the carrier rates were unreasonable by a large magnitude (*Western Fuels*), it likely would have reached the same conclusion using Simplified-SAC or Three-Benchmark. In another case (*Otter Tail*), where the STB found rates to reasonable, both Simplified-SAC and Three-Benchmark likely would have resulted in the same conclusion.

Can STB's SAC tests be further simplified or modified?

- The Three-Benchmark test is already relatively simple and straightforward. The Team's initial empirical analyses of two cases found that the Three-Benchmark test results are consistent with the results of the Simplified-SAC and the Full-SAC test. Further simplifications to the Three-Benchmark test would likely reduce its adherence to the CMP principles. Further analyses of other settled cases may be warranted to increase the confidence of our findings and conclusions.
- Similarly, the Team is skeptical of any further simplification of the Simplified-SAC, which could undermine the test's reliability. In addition, further simplification of Simplified-SAC would not necessarily incentivize shippers to use it.

Are there alternatives to CMP?

The research examined some alternatives to SAC and found that they would not satisfy the goal of the research, i.e., to reduce the time, complexity and expense historically involved in the litigation and resolution of rate reasonableness complaints in a way that is consistent with the Board's governing statute.

- The other nations with modern freight railways (Canada, the UK, and Australia) either do not have maximum rate regulation (e.g., Canada, which uses commercial arbitration to resolve rate disputes) or have separated track and train operation (the UK and Australia) and confine regulation to access charges. In the UK and Australia, shippers do not have any access to maximum rate regulation. Interestingly, the latter two have made some use of SAC, but because they subsidise their track operators, the use of SAC is complicated and in some cases irrelevant (because the SAC rates far exceed the subsidised cost of track access). Unless Congress wishes to make a fundamental regime change to track separation and/or access, the UK and Australian approaches provide little guidance to the STB regarding maximum shipper rate regulation.

- The study looked at maximum rate regulation in utility sectors, where either rate-base rate-of-return or price cap regulation is used. These are not suitable for US railroad freight rate regulation, as these methods either directly or indirectly regulate all rates of the utility, which is not the intent of Congress under the Staggers Act as carried forth in ICCTA. As well, rate-base rate-of-return regulation is not a simpler methodology, and price cap regulatory proceedings have become increasingly complex, time consuming and expensive.
- The study looked at a simpler methodology used in telecommunications, TELRIC. While simpler to implement than SAC, TELRIC is not suitable for US freight rail. To begin with, it is a methodology for access rates and not for shippers' rates. A shipper would lose the ability to complain about a carrier's rate and seek regulatory relief. The FCC adopted TELRIC to meet the legislative requirement of the Telecommunications Act of 1996 to inject competition into existing telecommunications networks and was not guided by a revenue adequacy concern. This was perhaps justifiable as part of telecommunications industry "deregulation," as the existing telecomm companies already had high rates of return. But the revenue inadequacy of the U.S. freight rail industry was a major concern that animated the Staggers Act and could become so again under TELRIC. TELRIC provides no guidance as to what methodology should be used to allocate common and unattributable costs, and our analysis demonstrates that the simple cost allocation methodologies -- such as a common percent mark-up to contribute to fixed costs, or mark-ups based on the shipper's traffic shares in tons or revenues -- give wildly different results. Since the TELRIC method provides no guidance between these alternative cost allocation methods, because it is not concerned with revenue adequacy, and because it sets an access charge and not a shipper's charge, we find no basis for it to be a substitute for CMP for assessing whether a rail carrier's rates are unreasonable. Further, in light of these deficiencies, TELRIC would not be an acceptable methodology even if the Congress decided to transform railroad policy radically by enabling widespread access, with or without separation of track from train operations.
- The study also looked at ECPR, an easy-to-use access rate methodology proposed by some for use in rail transport. However, ECPR too is not a methodology for shipper-level maximum rate regulation. The core principle of ECPR is to protect the contribution to the fixed costs of the incumbent railroad, with no provision for assessing whether existing revenues for the movement embody unreasonable monopoly profits. The authors of this methodology acknowledge this limitation and nevertheless recommend use of SAC to make such an assessment. Hence, ECPR is neither acceptable as a maximum shipper rate methodology nor as an access rate methodology.
- The study also examined M-ECPR. Its main difference from ECPR is that it uses a 'market rate' rather than the incumbent carrier's existing rate as its starting point. This is a paradox for freight rail, as the key issue is the lack of a competitive alternative; hence, there is no 'market rate' available to consider. However, there may be cases where a market rate could be constructed, such as a truck-to-reload rate, or a competitive rate for part of the distance, with an add-on rate constructed for a hypothetical build-in for the final distance. The build-in rate would have to be constructed using a methodology that is the same or similar to SAC. However, this may be more straightforward than full SAC for two reasons. First, the distance of the hypothetical build-in rail segment would be short and easier to cost than full SAC. Second, the ECPR methodology

specifically rejects use of revenue from cross over traffic, eliminating that expensive aspect of Full SAC.

The project team's research found that M-ECPR could be adjusted and potentially used as a basis for shipper rate regulation in a few cases, such as where truck-to-reload is economically feasible, or where there is a competitive rail alternative for much of the shipment distance with a hypothetical build-in for a short distance. The main challenge for this approach to assessing reasonableness of shipper rates charged by an incumbent carrier is the need to obtain a rate from a competing carrier for part of the routing. Carriers may be unwilling to provide such rate quotes knowing that ultimately they are unlikely to get the business unless the shipper is willing to actually do a line build-in. The study observed one such case, where the threat of a build-in led the incumbent carrier to lower its rate yet not abandon the line. However, this example of contestability in the market was resolved commercially by the parties and did not require regulatory intervention.

In sum, the STB's Full-SAC method has stood the test of time as a maximum rate reasonableness methodology and is a justifiable complaint choice in some cases. However, the less expensive Simplified-SAC and Three-Benchmark approaches are available to shippers and may be a better option for shippers in many cases.

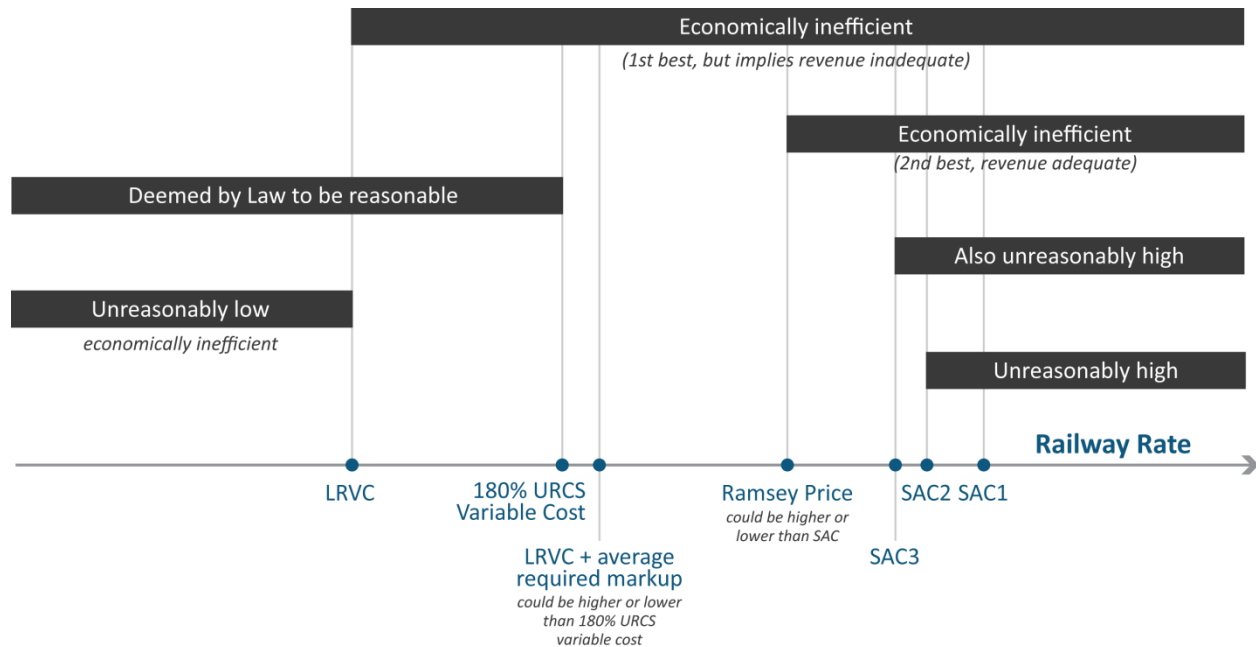
An access regime could be an alternative to full SAC, but (a) the shipper would lose access to maximum rate regulation, (b) there would still need to be a regulator to set carrier-to-carrier access prices, and (c) unless Congress is willing to abandon carrier revenue adequacy as a major objective, the rate reasonableness methodology for access charges will still be SAC or some equivalent for the most common disputes, such as coal rates.

Appendices

Appendix I: Comments on the Debate on the Boundaries of Economies of Scope

This appendix turns to a debate between the original proponents of the SAC test regarding the scope or boundaries of economies of scope. This involves a discussion regarding the different calculations of stand alone cost that were discussed in Chapter 3. For ease of reference, Figure 3.2 is reproduced here and key terms are restated.

Figure I-1: Different Measures of Rate Reasonableness



Source: Inter VISTAS representation

- Stand-alone cost SAC1 is the cost incurred by a shipper if it were to form its own company providing the transportation service for the traffic at issue but no other traffic would use the line. In the STB’s parlance, SAC1 does not offset the costs of the SARR using potential revenue from “cross-over traffic”. This SAC is considered unreasonably high as it does not allow the shippers to benefit from any economies of scope.
- SAC2 is the point where the revenue contributions from the other traffic utilizing the line are taken into account. SAC2 recognizes the benefits of economies of density/scope by modeling the SARR with traffic other than the complainant shipper. Any rate above SAC2 is unreasonably high.
- SAC3 is similar to SAC2 but is further offset by any marginal-cost-reducing effects from economies of scope. Indeed, economies of scope should reduce variable costs because there are certain costs that could be partially allocated across the entire enterprise because the railroad

actually operates in the context of an entire network. Economies of scope would not only produce a revenue benefit from cross over traffic, it could also reduce the unit cost of providing service. The argument in this report is that any rate above SAC3 should also be deemed to be unreasonably high.

As this is a very technical and abstract (although important) discussion in economic theory, a quick summary is offered.

- There were two major proponents of a SAC test: (a) Faulhaber and (b) Baumol (later with Willig).
- The debate involves whether the STB's SAC test considers all sources of economies of scope.
- Both Faulhaber and Baumol/Willig agree to use the first type: revenue from cross over traffic on the SARR. This is what was earlier described as SAC2.
- Faulhaber claims there are two additional benefits to the issue traffic of the shipper from economies of scope. Both are cost reducing effects (distinguished from the revenue offsetting effect of SAC2). One effect from the presence of other traffic (bridge traffic) on the SARR, the other from traffic on other lines of the railroad company, potentially in totally different regions.
- The first cost reducing benefit (SAC3) is not discussed by Baumol/Willig, but, as explained earlier in this report, our view is that the presentation of evidence of the cost-reducing effects of economies of scope on the SARR would be consistent with the STB's analysis of CMP and SAC.
- The second cost reducing benefit (which could be called "SAC 4") is not shown on the diagram and, in our view, should not be included in the SAC test for several reasons:
 - it would greatly add to the cost and complexity of the SAC test,
 - there is ambiguity as to what constitutes the rest of the network, and
 - In theory, it could induce the railroad to reorganize in a way that would make it difficult to attribute economies of scope from other lines to the line at issue.

What follows is a more detailed discussion.

The difference between SAC2 and SAC3 described above is similar to what Gerald Faulhaber described in a Verified Statement in 2014.³⁶⁵ One of his arguments was that the SAC test does not include any allowance for economies of scope.³⁶⁶ Our interpretation of Faulhaber's statement is that there are two effects that reduce the cost responsibility of the issue traffic: The first is the revenue effect from the cross-over traffic and the second is the cost reducing effect from the entire network (the entire company). While he agreed that the revenue effect is taken into account by the STB's SAC test, we read Faulhaber to be saying that the cost reducing effect from the entire network may not be taken into account in the computation. That is, the STB's test is a SAC2 construct and not a SAC3 concept. Thus, the STB's SAC

³⁶⁵ Faulhaber, "Verified Statement – Stand-Alone Cost – Response to Comments," Ex Parte No. 722 (Sub-No. 2) et al, *supra*, n. 119.

³⁶⁶ *Ibid.*

test would not be able to test appropriately for cross-subsidization of the issue traffic to other traffic on the SARR.

In his criticism of the stand-alone cost test, Faulhaber recalled that the original concept underlying his SAC test was that the firm is profit-constrained with economies of scale and scope and that the benefits of these economies were being shared between the firm's individual services:

The model of Faulhaber (and later BPW) of a profit-constrained enterprise assumed that the monopoly firm possessed economies of scale and of scope, thus justifying its monopoly status. Should the individual services (or group of services) be offered on their own ("stand-alone"), the total cost to the economy would be greater than if the services were offered by a single monopolist; this is the meaning of economies of scale and scope. The benefits of realizing these economies via monopoly could well be shared among the individual services. In fact, the subsidy-free condition that all services (and subsets thereof) be priced no higher than their stand-alone cost ensures that all services share in the benefits of economies of scale and scope. Different services may receive a greater or lesser share of these benefits than others, but all services might be expected to share to some extent. However, if a particular service is priced exactly at standalone cost, then by definition, it is sharing none of the benefits of scale and scope. In the context of cross-subsidy and contestable markets, then, stand-alone costs are an absolute upper limit on pricing, which in themselves do not permit the sharing of the benefits of the scale and scope of the firm, and by no means a prescription for rate-setting.³⁶⁷

In essence, Faulhaber was saying that the SAC test does not take into account the potential economies of scope in the U.S. rail industry. The measure of the SAC for an isolated piece of a railroad company's network (the stand-alone railroad) does not take into account the fact that a line is part of a bigger network and hence that the cost for operating that line as part of a large network may be lower because of economies of scope with other lines.³⁶⁸

As noted previously, we view Faulhaber as proposing yet another concept, which might be labelled as SAC4, which has three aspects to economies of scope:

- The issue traffic would pay a lower rate due to the revenue contribution from other traffic that could use the SARR (SAC2).
- The issue traffic could pay a lower rate because the presence of other traffic on the SARR reduces unit cost of traffic (SAC3). We previously stated our view that CMP and SAC principles should allow the shipper to include such benefits in its SAC submission.
- The additional concept is that the issue traffic could pay a lower rate because economies of scope between the rest of the railroad company's network and the SARR (SAC4).

Our understanding of what we call Faulhaber's SAC4 is that the issue traffic can benefit not only from the revenue contribution and cost reductions created by other traffic that could use the SARR, but also can

³⁶⁷ Ibid., 8.

³⁶⁸ There is also the potential for cost savings related to economies of scale, although Faulhaber focuses his discussion on economies of scope.

benefit from cost reductions created by traffic elsewhere on the railroad company's network that does not have any contact with the SARR line. The concept is that a railroad company that operates many different lines has lower costs on any given line because of that company's other lines in other regions.

While the STB has not ruled on the issue, in our judgment SAC4 is not an appropriate maximum rate under the Full SAC test because of the difficulty of capturing the type of off-SARR cost reductions under the CMP and SAC principles articulated by the STB. The shipper would now need to develop and put forward evidence not only on the costs of operating the line needed for its own traffic, but also for the entire system. Alternatively, this might be done as a simpler cost reduction allowance afforded the shipper from the cost reducing benefit from the rest of the railroad company's system. This then raises the issue as to whether this benefit derives from the actual system, or whether the shipper could construct a hypothetical railroad company's network. Further, an effort to impute to the SARR cost reducing economies of scope from other parts of the incumbent carrier's network theoretically could induce railroads to restructure into separate operating companies with separate lines for each license.

Robert Willig's response to Faulhaber³⁶⁹ is that Faulhaber erred because the SAC test already accounts for the economies of scope through the revenue contribution from the cross-over traffic:

The stand-alone cost test empowers a complaining shipper over whom the railroad has market dominance to include in its test any and all the additional traffic that the shipper believes contributes economies of scale or scope to the railroad's provision of its services. Through this process, the shipper can assure that it shares in the benefits of the railroad's economies of scale and scope, since the amount of the stand-alone costs that the complaining shipper's revenues may be called upon to cover decreases whenever more traffic can be added to the stand-alone railroad such that the traffic's incremental revenue exceeds the additional costs incurred by the stand-alone railroad to access and handle that additional traffic. The addition to the cost of the stand-alone railroad due to adding additional traffic is lower, and thus the added traffic is more beneficial to the complaining shipper, the stronger are the economies of scale and scope.³⁷⁰

But, as we have noted, there is a difference between the concepts described by Faulhaber and Willig. Faulhaber is saying that there are two effects: the cost-reducing effect of operating the rail line and the revenue-enhancing effect (i.e., the revenue that can be earned from this asset by adding additional cross-over traffic). Willig focusses only on the revenue effect. We also interpret Faulhaber as saying that there are two cost reducing effects from economies of scope: one from the SARR and one from the rest of the railroad company's network. The cost-reducing effect of operating the rail line refers to the fact that because the rail line is part of a bigger network, some common and joint costs are shared at an enterprise level and that the SAC, in its current form, does not enable the shippers to share the benefits of these economies of scope.

³⁶⁹ Willig, Robert, "Reply Verified Statement," Ex Parte No. 722 Railroad Revenue Adequacy, Reply Comments of the Association of American Railroads, (2014, November 4).

³⁷⁰ Ibid.

To make the point clearer we present a basic form of the SAC computation:

$$\begin{aligned}
 \text{Stand Alone Cost} &= FC + VC(\text{shipper's traffic, other traffic moving on the SARR, rest of the network}) \\
 &\qquad\qquad\qquad \underbrace{\hspace{15em}}_{\text{Cost Reducing Effect}} \\
 &\qquad\qquad\qquad - \underbrace{\text{net revenues of the bridge traffic}}_{\text{Revenue Effect}}
 \end{aligned}$$

With FC = Fixed Cost and VC = the variable cost of the traffic at stake

The issue that Faulhaber identified is that there is a cost-reducing effect from the rest of the network that is not taken into account in the revenues from the cross-over traffic. Since the incumbent railroad operates a more expansive network, traffic on this network shares common production factors and costs with the traffic at issue and consequently generates economies of scope on the cost side of the equation.

Willig seemed to suggest that there is only one effect, the revenue effect, and that it covers the cost effect. That is, the fixed costs are being shared amongst a larger traffic base when the cross-over traffic is accounted for. While this revenue effect is properly accounted for in the SAC case, it does not take into account either of the cost reducing effects described by Faulhaber. The STB's approach to SAC does allow the shipper to take into account one of Faulhaber's cost reducing effects, that from other traffic on the SARR.

As discussed, Faulhaber's second cost reducing effect, from the rest of the network, must be viewed as problematic. Including it will only increase the cost of a SAC proceeding, adding considerably to the shipper's burden of evidence. There is ambiguity as to what constitutes the network – if the efficient SARR is a hypothetical construct, could the network also be hypothetical? Where does this end?

Econometric Evidence of the Cost Reducing Effect of Economies of Scope

Having reviewed Faulhaber's argument and the Willig response, our view is that Faulhaber has raised a point not considered by Willig: cross-over traffic may have a cost reducing effect/benefit due to economies of scope. Faulhaber goes further to claim that unrelated traffic on other parts of the railroad company's network of routes may also have a cost reducing benefit.

These two cost reducing benefits are conceptual issues raised by Faulhaber. Empirically they might or might not be relevant. To our knowledge, no detailed study of the cost reducing effects of the network has been made, but some of the academic empirical cost function work may shed light on the issue.

Econometric enterprise-level cost functions such as appeared in the academic literature in the 1970s and 1980s did allow such relationships. Some of the cost functions shown in the research included second order interaction terms between the network size (and investment in network) and the other factors of production. A review of the cost function results from the literature found ambiguous results in this regard. The second order interaction terms between network size and the other production function (or cost function) terms found both insignificant coefficients in many cases, or results that were not robust and changed (e.g., changed sign) in different specifications. These results do not provide strong support for

Faulhaber's conceptual concern. However, these academic studies were not designed to specifically look at the Faulhaber issues. Perhaps this is an area for further research. In the meantime, the limited evidence does not point to this being such a major concern that the STB should reconsider its SAC test and introduce even greater complexity and cost.

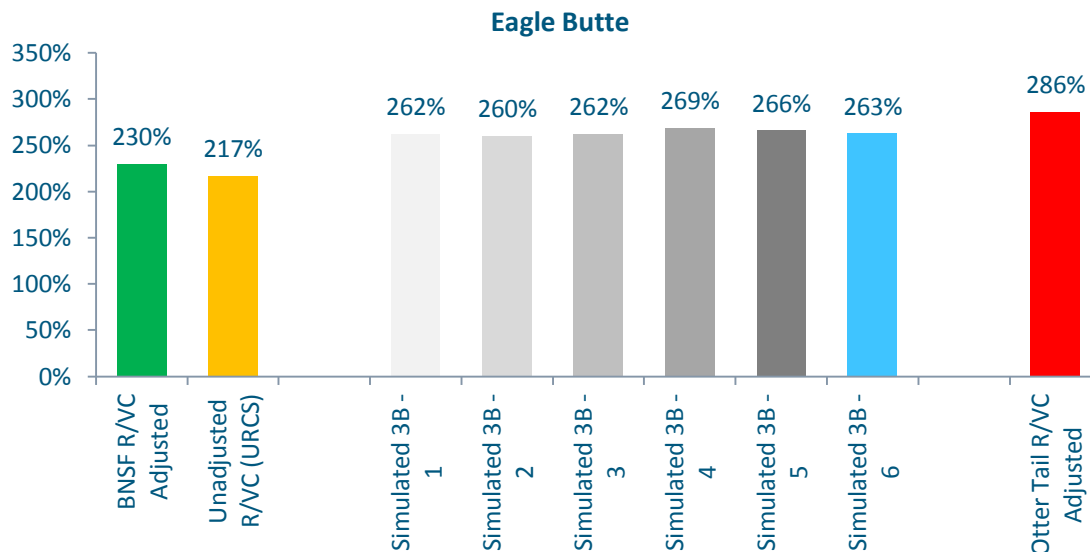
Appendix II: Three-Benchmark Adaptation for *Otter Tail v. BNSF* using Eagle Butte as Point of Origin

This appendix provides the results of the Three-Benchmark test adaptation for the *Otter Tail* case using Eagle Butte as the point of origin. Results are similar to those presented in the report based on Bel Ayr as the point of origin.

Results Based on the Current (2007) Simplified Standards for Three-Benchmark

Error! Reference source not found. summarizes the results of the Three-Benchmark approach using the 2007 RSAM calculation for the traffic originating from the Eagle Butte mine. The bars in varying shades of grey represent the six different comparable data sets calculated by the project team (described above), which vary by type of rail car, car ownership, and distance traveled. The “BNSF adjusted R/VC ratio” was calculated by BNSF for the issue traffic, adjusting for movement specific costs. The “Unadjusted R/VC (URCS)” was computed by this study’s project team using URCS data, averaging the R/VC ratios for 2002 and 2003, and calculated using the movement characteristics from the public case filings.³⁷¹ The “Otter Tail Adjusted R/VC” is the R/VC for the issue traffic, calculated by Otter Tail, but adjusting for movement specific costs.

Figure II-1: Results of the Three-Benchmark Using the 2007 RSAM



Source: Inter VISTAS calculations based on URCS data and public filings

³⁷¹ Movement inputs from STB Docket No. 42071, BNSF Opening Evidence, pp. II-14-16 (filed Jun. 13, 2003). The calculations are consistent with the current methodology for calculating R/VC ratios (no movement specific adjustments allowed).

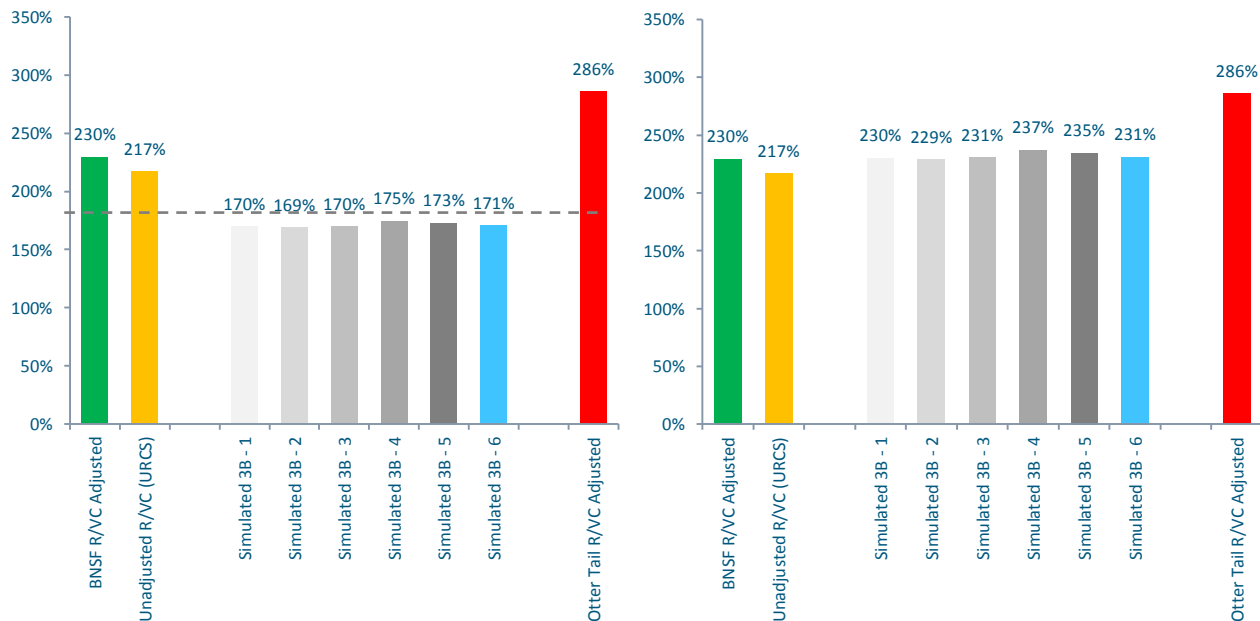
The results are similar to those using Bel Ayr as point of origin. Based on the unadjusted R/VC (217%) which is calculated from URCS data, the Three-Benchmark test suggests that the challenged rates are not unreasonable. This outcome using the Three-Benchmark test, based on the current 2007 RSAM standards, is consistent with the outcome of the actual STB decision using the Full-SAC methodology.

Results Based on the 2002 Simplified Standards for Three-Benchmark

Similarly, we re-examined what the outcome of the *Otter Tail* case might have been had the parties used the Simplified Standards available in 2002. At that time, shippers and railroads were authorized to adjust the R/VC ratio of the traffic at issue. In addition, the RSAM was not a single measure but a range. The lower band of the range was the RSAM measure adjusted for the revenue shortfall of traffic priced below 100% while the upper band was the non-adjusted RSAM. The lower band was considered to understate the revenue requirement to be borne by shippers. The upper band was considered to overstate the revenue requirement to be borne by shippers:

Error! Reference source not found. illustrates the results of the team’s adapting the Three-Benchmark approach in effect in 2002, but applying the pre-2007 RSAM calculations which allow for a lower and upper band. As can be seen in the left-hand graph below, the six calculated Three-Benchmark allowable R/VC ratios based on the RSAM lower band are below the 180% threshold. The results shown here are for traffic originating at the Eagle Butte mine.

Figure II-2: Results of the Three-Benchmark Approach Using the Pre-2007 RSAM



Source: InterVISTAS estimates.

Results are similar to those obtained with the Bel Ayr mine. Under the pre-2007 methodology, BNSF’s adjusted R/VC and the URCS unadjusted R/VC lie in the RSAM range, but Otter Tail’s adjusted R/VC are above the range. In this particular case, it is not possible to reach a conclusion on the rate

reasonableness because the formula does not indicate whether the comparable should be adjusted upward or downward. As a result, we cannot reach unambiguous conclusions on the results using the pre-2007 methodology. As the original Simplified Guidelines stated, “the formula was never intended to provide a final result, but only a starting point for a more particular analysis.”³⁷²

³⁷² *Simplified Guidelines*, 1 STB at 1043.

Appendix III: Development of the ECPR Concept for Freight Rail

As discussed in Section 7, as an alternative to direct regulation of rates paid by shippers (i.e. conduct regulation), Congress could expand the STB's existing authority to order trackage rights and reciprocal switching to create an access regime for railroads, a form of structural regulation. The access regime requires the regulator to not only enable the access by appropriate rules and regulations; it must also establish the access charges. TELRIC is one methodology for access pricing. ECPR is another, and has specifically been recommended by some for use in the U.S. railroad industry.³⁷³

The concept of ECPR as applied to railroads was first articulated by W.J. Baumol in 1983. In that analysis, the ECPR was referred to as the "Parity Principle." Baumol wrote:

The price of trackage rights must, of course, at least cover, among other things, the long-run incremental cost of the use of the track and facilities by the tenant railroad. This long-run incremental cost figure must:

- *Include all the pertinent variable costs caused by the use of trackage rights;*
- *Contribute enough for replacement of the incremental capital used in the process (i.e., depreciation), where replacement costs must not be valued at the initial (or historical) cost of the item, but at its cost at the time it will need replacement;*
- *Contribute a fair return on all the landlord's capital valued at its economic replacement cost, regardless of the degree of its durability, at the current cost of capital as given by the earnings against which the landlord railroad must compete for funds;*
- *Compensate the landlord railroad for any net earnings which it must forego as a result of the tenant's use of trackage rights.*³⁷⁴

The concept was expanded and rebranded in a 1994 article by Baumol and J Gregory Sidak, which provides the first use of the term ECPR.³⁷⁵

Some authors have cited the simplicity of ECPR, examples of which are:

*The simplicity of this apparently 'cost-based' rule seems to be a significant advantage over Ramsey pricing rules, which require knowledge of various elasticities.*³⁷⁶

The well-known ECPR achieves efficient entry by equalizing the access price that an entrant should pay to the incumbent with the sum of the cost of providing the access and the latter's

³⁷³ See for example, Baumol and Sidak, "The Pricing of Inputs," 185-186.

³⁷⁴ Baumol, William J., "Some Subtle Pricing Issues in Railroad Regulation," In *Railways*, ed. Chris Nash, Mark Wardman, Kenneth Button and Peter Nijkamp, 175-189 (Massachusetts: Edward Elgar Publishing, 2002), Originally published in *International Journal of Transport Economics*, 10 (1983), 341-355: 349-350.

³⁷⁵ Baumol and Sidak, "The Pricing of Inputs," 171-202.

³⁷⁶ Armstrong, Doyle, and Vickers, "The Access Pricing Problem," 131-150.

*opportunity cost (i.e., the incumbent's retail price mark-up) when the incumbent's retail price is regulated*³⁷⁷

*The basic logic of efficient component pricing appears to be a robust starting point for policies to encourage competition and dynamic efficiency while preserving the natural monopoly efficiencies of the local delivery network.*³⁷⁸

Criticisms of ECPR. However, ECPR has also received criticism from economists and regulators, principally because it could preserve any existing unreasonable exercise of market power by an incumbent operator in a non-competitive situation.

For example, in *Verizon Communications, Inc. v. FCC*, 535 U.S. 467 (2002), the Supreme Court upheld the FCC's rejection of ECPR (in favor of TELRIC) as a means of determining appropriate access prices to network bottlenecks:

*The FCC rejected ECPR because its calculation of opportunity cost relied on existing retail prices in monopolistic local-exchange markets, which bore no relation to efficient marginal cost. We conclude that ECPR is an improper method for setting prices of interconnection and unbundled network elements because the existing retail prices that would be used to compute incremental opportunity costs under ECPR are not cost-based. Moreover, the ECPR does not provide any mechanism for moving prices towards competitive levels; it simply takes prices as given. In effect, the adjustment for opportunity cost, because it turns on pre-existing retail prices generated by embedded costs, would pass on the same inefficiencies and be vulnerable to the same asymmetries of information in ratemaking as a straightforward embedded-cost scheme.*³⁷⁹

The Court further noted:

*ECPR advocates have since responded that the FCC was wrong to assume a static tether to uncompetitive retail prices, because ECPR, properly employed, would dynamically readjust the opportunity-cost factor as retail prices drop. But this would not cure the distortions caused by passing any difference between retail price and most efficient cost back to the incumbents as a lease premium.*³⁸⁰

Two prominent critics of ECPR were Nicholas Economides and Lawrence J. White, who authored numerous articles with titles such as "Access and Interconnections Pricing: How Efficient is the Efficient Component Pricing Rule?" and "The Inefficiency of the ECPR Yet Again – A Reply to Larson." The authors begin by providing faint praise for ECPR.

³⁷⁷ Jeon, Doh-Shin, and Sjaak Hurkens, "A Retail Benchmarking Approach to Efficient Two-Way Access Pricing: No Termination-Based Price Discrimination," *The Rand Journal of Economics* 39, no. 3 (2008): 822-849.

³⁷⁸ Crew, Michael A., and Paul R. Kleindorfer, *The Economics of Postal Service: A Research Study Supported by WIK* (New York: Springer Science & Business Media, 1992).

³⁷⁹ 535 U.S. at 514.

³⁸⁰ *Ibid.*, note 32.

The ECPR has a seductive logic: It insures that a rival producer of the complementary component can provide service only if that producer is at least as efficient as the monopolist in the production of the complementary component; i.e., the ECPR insures that production will not be diverted to the inefficient producer.³⁸¹

However; the thrust of the Economides and White argument is embodied in the following quotation.

The ECPR ... would prescribe that the monopolist's markup or overcharge be a component of the access fee. Thus, the ECPR would deter inefficient rivals (those with marginal costs that are higher than the monopolist's MC) and prevent inefficient production. But the ECPR also protects the monopolist from any competitive challenge by these rivals and thus protects the monopolist's profits; and the ECPR preserves the allocative or consumption inefficiency that results from the monopolist's excessively high price for through service.³⁸²

Other critics recognize the weakness of protecting monopoly profits, while still acknowledging ECPR's strength as a possible regulatory tool. Alfred E. Kahn and William E. Taylor argued that ECPR is a mechanism for ensuring access of competitors to bottleneck facilities controlled by incumbent monopolists. They wrote that ECPR could enable competition to achieve "first-order technical efficiency." Yet they also recognized ECPR's potential harm in preserving an incumbent provider's opportunity cost.

The absolute level of the interconnection charge and the opportunity costs or contribution it contains are, however, of genuine economic importance. It is this other side of the coin that we wish Baumol and Sidak had emphasized more than they do. True, as they observe, the fact that a firm subject to intense competition will seek to recover the net profits that it loses as a result of making any of its facilities available to competitors means that such a charge cannot be regarded in itself as monopolistic. But a monopolist too, will seek to recover those "opportunity costs," and by so doing recoup in its charges for the essential input such monopoly profits as it was previously earning from its direct retail sales.³⁸³

M-ECPR. In 1996, Sidak collaborated with Daniel F. Spulber, writing about ECPR's preservation of inordinately high access prices.³⁸⁴ The paper advanced the concept of a "market determined efficient pricing rule" (M-ECPR).

When market alternatives are present ... the price of those alternatives determines the opportunity costs of unbundled network services. This constraint on the magnitude of opportunity costs was not recognized in the earlier literature on the ECPR, perhaps because Baumol and Willig developed the ECPR in the context of trackage rights in railroading and interconnection in local telephony – both instances where competition for the bottleneck input was by definition completely foreclosed.³⁸⁵

³⁸¹ Economides, Nicholas, and Lawrence J. White, *Access and Interconnection Pricing: How Efficient is the Efficient Component Pricing Rule*, 40 Antitrust Bulletin 557 (1995).

³⁸² Ibid.

³⁸³ Kahn and Taylor, "Pricing of Inputs Sold to Competitors," 225.

³⁸⁴ Sidak and Spulber, "*The Tragedy of the Telecommons.*"

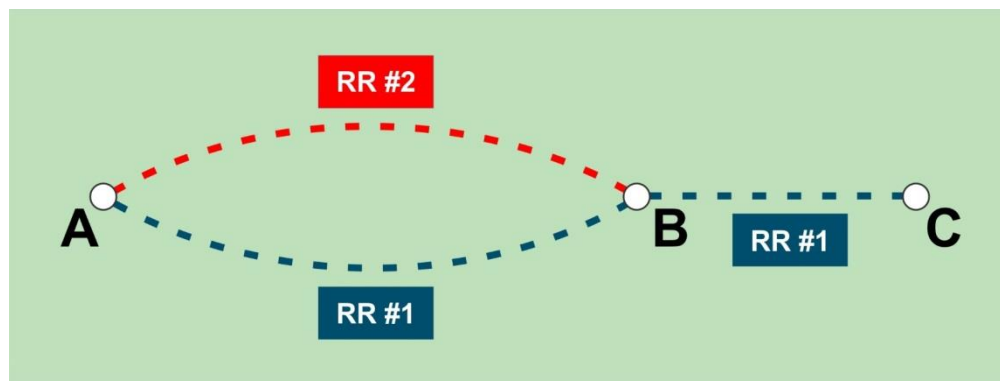
³⁸⁵ Ibid., 1094.

M-ECPR could be used whether there is an existing or a potential alternative to using the incumbent carrier (RR #1 in Figure 7-1). This might be, for example, an intermodal movement or an indirect railroad routing from A to C. However, it could also be a potential new market alternative, such as RR #2 building in a new line from B to C. The latter introduces a hypothetical railroad concept, similar to SAC. The M-ECPR would estimate the A to C rate, including the costs of the build-in, and use that to reverse engineer an access charge to be paid to RR #1 on B to C. The M-ECPR starts to embrace concepts of SAC, including specifying a hypothetical railroad line, estimating future costs and requiring coverage of the total costs of the hypothetical railroad line.

New Zealand supports use of ECPR in Telecommunications Sector. Other nations however have not rejected ECPR. In 2008, The High Court of New Zealand heard a case brought by New Zealand's Commerce Commission against Telecom Corporation of New Zealand Limited and Telecom New Zealand regarding access prices.³⁸⁶ The Court ruled against the defendant and supported use of ECPR as a measure for establishing an appropriate price for access to the bottleneck network component.

What does the ECPR rate cover? In a 2000 paper, Beshers developed a set of equations to depict the components that the ECPR rate must cover and how to compute it.³⁸⁷ Beshers developed the formula in the context of a movement from A to C, as depicted in Figure 7-4, reproduced below, and discussed in Section 7.7.

Figure III-1: Railroad Bottleneck



Beshers decomposes the total price charged by an existing monopoly railroad,³⁸⁸ handling a unit of a commodity between origin (A) and destination (C), as

- (IC₁) - The incremental cost of operating over the “competitive” segment, plus
- (IB) - The incremental cost of operating over the bottleneck segment which it controls , plus

³⁸⁶ ICT Regulation Toolkit. *New Zealand Commerce Comm’n v. Telecom Corp. of New Zealand Limited and Telecom New Zealand Limited*, <http://www.ictregulationtoolkit.org/en/toolkit/notes/PracticeNote/3277>.

³⁸⁷ Beshers, “Efficient Access Pricing,” 21-22.

³⁸⁸ The carrier is a monopoly in the sense that it is the only carrier that is able to transport the shipment *by rail* the entire journey from A to C. The discussion abstracts from the possibility of competition from another mode (truck) or a multimode operation (rail to B, then truck), or from source of supply or product competition.

- (C_1) - The net contribution to fixed costs³⁸⁹ that the incumbent railroad achieves from the entire move from origin A to destination C

Note that (IC_1) , the contribution to fixed costs includes not only the contribution to the fixed costs of track segment from B to C, but also the fixed costs for the track from A to B.

Thus, the total price of a movement (PF_1) is as follows:

$$PF_1 = IC_1 + IB + C_1$$

Beshers envisioned that the contribution to fixed costs could be computed as a residual by deducting "incremental costs" per unit from the price or rate charged by RR #1.³⁹⁰

$$C_1 = PF_1 - (IC_1 + IB)$$

Note that the incumbent carrier controlling the bottleneck segment (RR #1) may be charging an extraordinarily high rate, which consequently implies a similarly high contribution to fixed cost from the move from A to C. Assuming, as Beshers does, that the incumbent's contribution is equivalent to its opportunity cost, the resulting ECPR access charge would likewise be over-estimated.

For the price that a new entrant carrier would charge under an access regime (RR #2), the notation is comparable, but with one distinction. A term for the access price for use of the bottleneck segment (P_B) is substituted for the term for the incremental cost of operating over the bottleneck segment (IC_1). In addition, (i) the price that the new entrant would charge to the shipper would also need to reflect some contribution to the new entrant's overall operations, C_2 , and (ii) the term IC_2 would include the incremental costs for RR #2 for hauling the shipment from A to B and from A to C.

$$PF_2 = IC_2 + P_B + C_2$$

As characterized by Beshers, under ECPR the access price (P_B) would be equal to any incremental bottleneck cost incurred by the incumbent monopolist (e.g., any additional administrative or insurance costs), plus the opportunity cost of foregone contribution (C_1):

$$P_B = IB + C_1$$

The potential to compute SAC with ECPR. Baumol and Sidak³⁹¹ contended that ECPR's efficiency "is confirmed indirectly by the fact that it yields a price level set in precisely the same way it would be in a perfectly competitive or contestable market." They say that if the appropriate ECPR-based price is established for access, rail traffic will assign itself to the more efficient of the two carriers.

³⁸⁹ Beshers envisioned contribution to fixed costs as a residual after deducting "incremental costs" from revenue. Contribution would necessarily include economic opportunity costs but the latter could be reduced by redeploying resources to other ends.

³⁹⁰ He qualifies his equation by stating that the contribution, the economic opportunity costs to RR #1 if it loses the business to another carrier, could be reduced if it is possible for RR #1 to redeploy fixed resources to other uses.

³⁹¹ Beshers, "Efficient Access Pricing," 182.

An often-cited shortcoming of ECPR is if the incumbent's price (P_{F1} in the above formulae) provides monopoly profits, then the implied opportunity cost will also be high, thus ensuring continued monopoly earnings of the incumbent.³⁹² The solution, according to Baumol and Sidak, is to impose a "ceiling upon final-product prices" based on stand-alone cost.³⁹³

Therefore, ECPR is not a substitute for stand-alone cost as a determinant of rate reasonableness, as ECPR has the ability to preserve an incumbent's unacceptably high rates by their inclusion in the access rate calculation. Consequently, ECPR-based rates must remain subject to SAC or some other means of limiting excessive access prices. If ECPR rates must first satisfy the requirements of SAC, then it does not represent an easier, more affordable, and more efficient alternative to STB's existing full SAC processes.

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³⁹² Ibid., 195-196.

³⁹³ Beshers observed that, while final prices cannot exceed SAC, that measure does not encourage the efficiency that is available with ECPR. Ibid., 21-22.

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