Surface Transportation Board Report to Congress Regarding the Uniform Rail Costing System

Submitted Pursuant to Transportation and Housing and Urban Development, and Related Agencies Appropriations Bill, S. Rep. No. 111-69 (2009)

By the Board,
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EXECUTIVE SUMMARY

In August 2009, the Senate Committee on Appropriations directed the Surface Transportation Board (Board or STB) to submit a report providing basic, moderate and comprehensive options for updating the Board's general purpose costing methodology, the Uniform Rail Costing System (URCS). The Committee's request dovetailed with an initiative the Board began in FY2009 to review URCS, its history and purposes, and its use in performing the Board's statutory functions. The Board evaluated URCS' current functionality and studied criticisms of URCS made by stakeholder groups (including railroads and rail shippers) as well as by transportation economists and other analysts. This report discusses the Board's review and, pursuant to the Committee's request, describes a range of options the Board could consider to update URCS.

The Board uses URCS to calculate, for each large railroad, a system-wide estimate of the proportion of the railroad's costs of providing service that are variable with changes in traffic volume (as opposed to those costs that remained fixed regardless of traffic volume). URCS develops variable costs estimates by relying principally upon a series of statistical estimation tools – regression equations – that were developed by the agency in the 1980s. The resulting URCS variable costs are used in a wide variety of Board proceedings, including those determining whether a railroad's rates are unreasonably high.

There are several compelling reasons for updating URCS. *First*, there has been no significant review of URCS since it was adopted by the Board's predecessor, the Interstate Commerce Commission (ICC), in 1989. URCS should be updated periodically to ensure that it remains reliable.

Second, the Board has increased its reliance on URCS. In the past 5 years, the Board has adopted a number of changes to its rate case methodologies that give URCS a more prominent role in determining whether a rate is reasonable and what relief a rail shipper should receive. The increased reliance on URCS costs should be accompanied by increased vigilance with regard to continued accuracy.

Third, URCS should be more user-friendly for the stakeholders that rely upon it to assess whether to initiate rate reasonableness litigation before the Board. The Board believes that URCS programming can be made simpler and more transparent.

The Board believes that it is time to consider moderate updates to URCS to ensure that the model continues to produce variable costs that are as accurate and reflective of the modern rail industry as practicable. As detailed in Part III, these updates would include (1) updating the legacy computer programs that support URCS and developing a more user-friendly URCS program, (2) revisiting what is known as the "make-whole" adjustment to URCS (which incorporates certain efficiencies obtained when moving goods in higher-volume shipments), (3) examining how URCS allocates the costs associated with the transportation of hazardous materials, (4) changing the annual railroad reporting requirements, (5) considering updates to the historic dataset over which URCS costs are estimated, and (6) reconsidering how URCS treats railroads that consolidate with other railroads during the period over which costs are observed. The Board anticipates these changes to URCS would cost the agency approximately $625,000 beyond normal operating expenditures and would take approximately 2 years to complete. Many of these suggested changes to URCS would be subject to rulemaking procedures.

At this time, however, the Board is not requesting that Congress appropriate the significant additional funding on top of the $625,000 needed for the moderate update of URCS, that would allow it to do the most comprehensive review of URCS. An exhaustive review would consider major adjustments to the underlying statistical estimation regressions and updates to the decades-old operational "special studies" that are used in URCS. Although the Board believes that an exhaustive review of all of URCS' components may ultimately become necessary if URCS is to remain the Board's costing system, before requesting funds to embark upon that type of review, the Board would like first to explore whether there are cost-effective alternative costing models (described in Part IV of this report) that would better satisfy the Board's regulatory purposes. These models would use railroad shipment-specific pricing data, either in whole or in part, to infer the costs associated with particular railroad operations and movement types.

The agency has used URCS as its regulatory costing tool for more than 20 years. Although it may have shortcomings, URCS has produced costs sufficient for the Board to make its regulatory determinations. Thus, the Board's goal in a review of its costing methodology now would be to consider those cost-effective modifications to the model that would make it *more* reliable and *more* reflective of today's railroad industry.

The Board appreciates the Committee's willingness to consider additional funding for the Board's cost modeling. We recognize that this is a challenging economic period and that there are many important federal programs that require significant expenditures. We look forward to working with the Congress to help analyze the Board's resource requirements for this important project and to ensure that any updates to the Board's cost modeling are cost-effective and efficient.

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PART I: OVERVIEW OF THE UNIFORM RAIL COSTING SYSTEM

This Report responds to the Senate Committee on Appropriations' request in the Transportation and Housing and Urban Development, and Related Agencies Appropriations Bill, S. Rep. 111-69, at 108-09 (2009), that the Board study its options for updating the general purpose costing methodology known as URCS.[1] The Board commenced an URCS scoping project, examining URCS' history and purposes, its current functionality, and the criticisms of it made by stakeholder groups and other interested parties.

URCS was adopted in 1989 and is the tool the Board uses to estimate the variable costs of individual railroad movements and activities. Because many of the Board's functions – most significantly the determination of whether a rail carrier's rate falls under the Board's jurisdiction and is reasonable – involve the use of URCS variable cost data, URCS plays an important role in the agency's processes and decision-making.

Estimating railroad costs for particular movements with any degree of precision is an inherently difficult task. A railroad uses its physical assets (e.g., rail lines, locomotives, rail cars, yard equipment) to transport hundreds of different commodities between many different locations. Thus, there are many common costs (akin to overhead) that the railroad will seek to recover from all of its customers. The role of URCS is to estimate that portion of the variable costs of providing rail service that can be attributed to any given rail movement. URCS does this by using statistical techniques to estimate a carrier's variable unit cost in a set of defined expense categories on a system-average basis, resulting in one set of average URCS unit costs that can be used anywhere on that carrier's system.

The challenge in any regulatory costing methodology is that there is no accounting process that can precisely attribute costs to particular movements. By necessity, the methodology must incorporate assumptions and generalizations about railroad operations, some of which may not reflect individual situations. Also, the cost structure and operating practices of the railroad industry change over time. Costing assumptions based on past operations or best estimates about the norm for various types of rail operations might become less accurate over time.

Pursuant to both its statutory duty to periodically assess its cost accounting principles and this Committee's request, the Board is considering options to improve the functionality and accuracy of URCS. Though imperfect, URCS has served as the agency's costing tool for more than two decades and has produced costs sufficiently reliable for the Board to make regulatory determinations. Thus, what the Board would seek in any review of URCS are modifications that would make the costing model *more* reliable and *more* reflective of today's railroad industry.

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[1] The House of Representatives also referred to a multi-year review of URCS in its appropriations report. See Departments of Transportation, and Housing and Urban Development, and Related Agencies Appropriations Bill, H. Rep. No. 111-218, at 138 (2009).

A.   The Development of URCS

URCS was formally adopted by the Board's predecessor, the ICC, as the agency's general purpose costing system in 1989 and was implemented several years later.[2] However, given that costs have long played a role in the agency's processes, URCS necessarily evolved from earlier costing methodologies.

From 1939 until the adoption of URCS, the ICC used a cost accounting system known as Rail Form A.[3] Like URCS, Rail Form A was also used to estimate the variable costs of performing various rail services using statistical techniques and annual expense and operating data reported by the railroads to the ICC. Because the ICC developed Rail Form A before the advent of computers, the statistical techniques and calculations were necessarily relatively simple.

In 1976, in the Railroad Revitalization and Regulatory Reform Act (4R Act), Congress directed the ICC to develop a more accurate costing system.[4] To emphasize the importance of improving the ICC's cost accounting, four years later in the Staggers Rail Act of 1980, Congress created the Railroad Accounting Principles Board (RAPB) to provide guidance to the ICC. The RAPB's purpose was to evaluate "principles governing the determination of economically accurate railroad costs directly and indirectly associated with particular movements of goods, including the variable costs . . . ."[5] The RAPB was charged with providing a report to Congress within two years containing recommendations for an appropriate ICC costing methodology.[6] Congress's decision to create and fund the RAPB gave the ICC access to a panel of independent costing experts to make recommendations and to study the agency's proposals.[7] Over the course of the development of URCS, the RAPB issued a series of reports culminating in a Final Report in September 1987.

With guidance from the RAPB, the first major task the ICC undertook in refining its costing methodology was to revise the accounting system by which railroad cost data were collected, the Uniform System of Accounts (USOA). The USOA, first adopted in 1907, and now promulgated at 49 C.F.R. § 1200, specifies the accounting codes and categories that railroads are required to use for regulatory purposes[8] and explains the accounting requirements for certain

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[2] Adoption of the Unif. R.R. Costing Sys. As a Gen. Purpose Costing Sys. for All Regulatory Costing Purposes, 5 I.C.C.2d 894 (1989) (Adoption of URCS).

[3] Given its subject matter, this report necessarily uses a number of technical terms. The Appendix to this report is a Glossary of terms to aid the Committee and other interested persons.

[4] Pub. L. No. 94-210, Sec. 307, 90 Stat. 127 (1976).

[5] Pub. L. No. 96-448, Sec. 302, 94 Stat. 1985 (1980).

[6] The RAPB consisted of the U.S. Comptroller General and six appointees with accounting, railroad, shipper, economics and regulatory backgrounds.

[7] The RAPB had an annual budget of $1 million for each of 3 years (in then-current dollars).

[8] Railroads may use a different system of accounts for internal business accounting purposes.

types of transactions. Examples of USOA categories include track maintenance costs, capitalization rules, and liability estimates. The changes to the USOA made in response to the 4R Act included reporting of expense data by car type and the separation of each account into four components: salaries and wages, materials and supplies, purchased services, and other expenses.

Rail Form A was not compatible with the refined USOA, necessitating accounting conversions. More importantly, the agency concluded that Rail Form A variable unit costs had become less reliable over time. The Rail Form A variability factors, used to determine the proportion of total costs that are variable, were calculated by regression analysis that used railroad operating practices data from 1966-1970 and then applied them to current year total cost data.[9] The ICC determined that both the underlying data and the regressions themselves were no longer reflective of the operation of the current rail industry.[10]

Between 1980 and 1989, the ICC worked with the RAPB to design a new costing system that would be compatible with the refined USOA. The agency retained an economist, Dr. M. Daniel Westbrook, to evaluate, test, and implement the RAPB's recommendations regarding the design of a new uniform railroad costing regression study. Dr. Westbrook's work established the assumptions underlying the regression model used in URCS today and the econometric methods required to analyze the data.[11] The regression model determined the statistical relationship between dependent variables (expense account groups) and the independent variables (capacity and output) in order to separate total expenses into their fixed and variable components. The ICC, using Dr. Westbrook's work and in consultation with the RAPB, reached a number of fundamental conclusions regarding URCS:

- The model should be **linear**: A linear model estimates – for a given change in the independent variable – what proportion of that change is reflected in a change in the dependent variable. Here, the railroad's cost is the dependent variable, and the railroad's output and capacity are the independent variables. As the estimates produced by the linear model are constant, we can assume the relationships between the independent and dependent variables do not change at different levels of output.

- URCS should utilize a **panel dataset**. A panel dataset is one in which the data are available in both cross-sectional and time-series formats; i.e., data are available for

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[9] Regression analysis is a statistical estimation process used to find relationships between a dependent variable and one or more independent or explanatory variables. Regression analysis is used in the Board's URCS costing system to measure the relationship between actual railroad expenses (the dependent variable) to capacity and output factors (the independent variables). The portions of total expenses are divided into "fixed" and "variable" expenses. The levels of variable expenses are used in the development of Revenue to Variable Cost (R/VC) ratios.

[10] Adoption of URCS, 5 I.C.C.2d at 895-96.

[11] Dr. Westbrook is an Assistant Professor of Economics at Georgetown University. See Research Report on URCS Regression Equations (Oct. 17, 1988) (Westbrook Report).

individual Class I railroads[12] over a series of years. This differs from a cross-sectional dataset that would depict data for all railroads for only one year, or a time-series dataset that would depict data for a single railroad over a number of years.

- Railroads that merged during the panel dataset period should be treated as a **single merged entity** for the entire period. For example, the Union Pacific Railroad – which, at the time, was the result of mergers between the Union Pacific, the Western Pacific Railroad, and the Missouri Pacific Railroad – appears as a single railroad in every year, even though its carriers were separate entities in the earlier years of the panel dataset period.

- URCS should use 15 **expense account groups** from the **R-1 data** submitted to the Board by Class I rail carriers each year (instead of aggregating those expense account groups into a smaller or greater number of groups).[13]

- URCS should rely in part on **engineering relationships** based on numerous special studies completed by the ICC. These studies, some of which date to the 1930s, measured the time and effort involved in performing various railroad activities, and are the basis of the URCS "special study" factors. For example, the average distances traveled in various switching movements used in URCS were estimated by ICC engineers based on detailed maps for 49 separate railroads in 15 large cities (excluding New York and Chicago) over 60 years ago. Likewise, a figure of 6 MPH has been used to estimate the miles generated by train switching has been used since at least 1963.

- URCS should account for the added efficiencies of unit train, trainload and multi-car movements, over those of single car movements, and use a **"make-whole" adjustment** to redistribute the efficiency savings that a railroad obtains in higher-volume shipments across all of that carrier's lower-volume shipments. The make-whole adjustment maintains the same total sum of variable costs across all of the carrier's shipments, while recognizing the efficiency in the carrier's higher-volume movements.

With the above-described methodology, for each Class I carrier, URCS produces the portion of each category of R-1 costs that represents that carrier's average system-wide variable unit cost for that category in that year. It is important to note that URCS was not designed to reflect the actual costs of providing any particular service, but rather to develop a cost estimate that could be applied to a service that occurs anywhere on that carrier's system. Accordingly, the

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[12] Railroads are classified by the Board according to annual operating revenue: Currently, Class I railroads are those with $250 million or more in revenues, Class II railroads are those with less than $250 million but more than $20 million in revenues, and Class III railroads are those with $20 million or less in revenues as measured in 1991 dollars. 49 C.F.R. § 1201, General Instruction 1-1. The current Class I railroads are Union Pacific Railroad Company, BNSF Railway Company, CSX Transportation, Inc., Norfolk Southern Railway Company, Canadian Pacific Railway (Soo Line Railroad Company), Canadian National Railway Company (Grand Trunk Corporation), and Kansas City Southern Railroad Company.

[13] Class I railroads are required to file annual reports with the STB described as Forms R-1. These reports summarize the operating expenses and statistics for the year.

URCS system-wide average could be higher or lower than the actual cost of any particular movement.

The agency's decision in Adoption of URCS explained that the **statistical techniques** derived from the Westbrook regressions linked approximately 78% of the total expenses reported across 15 different expense account groupings with various output and capacity variables. The resulting "parameter estimates" from the regressions are then used to estimate the percent of a particular cost grouping that is considered variable, which is called the **variability factor**. For example, the fuel regression parameter estimates are used to determine that 96% of the running fuel expenses are variable with locomotive train miles, and so URCS assigns a 96% variability factor to running fuel expenses.

The remaining 22% of expenses are assigned **default variability factors** that are based primarily on prior judgments by the ICC regarding the appropriate variability. This category includes return on road property investment (estimated to be 50% variable) and capital expenditures (also 50% variable).

When it adopted URCS, the ICC concluded that the relative sophistication of URCS' statistical techniques was a significant improvement over the prior Rail Form A regulatory costing system. Indeed, the URCS regressions were generally accepted in the industry and conceptually easy to understand from an econometric perspective.

Despite the improvement of URCS over Rail Form A, however, the ICC recognized that it would need to review URCS regularly, with the first review scheduled just two years after URCS was originally adopted. This review was intended to include a reassessment of the fundamentals of URCS, such as whether a linear model was appropriate, the use of default variability factors, and to determine whether or not there was a superior regression methodology to that used by Dr. Westbrook. However, as discussed in Part II, due to budget and staffing limitations, only one limited review of URCS has ever occurred, and it did not address questions about URCS' underlying fundamentals.

B.   URCS Today

1.   Processes

The URCS computer programs and manual procedures are organized into three distinct phases that transform aggregate railroad expense and activity data into estimates of the cost of providing specific services.

In **Phase I**, the STB first compiles the raw data provided by the carriers and data from special studies (the engineering relationships described on p. 4) into a useable format. In the R-1 reports, the carriers allocate their total expenses into several thousand distinct expense accounts and provide details on several hundred different operating activities. These data (and the processes that carriers use to generate them) are then audited by Board staff. After the accuracy of the reports is validated, the Board creates an electronic database known as the URCS Master File (UMF), which contains data for the most recent five-year period. The Board then uses regression analyses to develop equations linking specific expense accounts groupings with particular measures of railroad activities, thereby determining the proportion of specific account groupings that vary with changes in the amount of specific activities.

In **Phase II**, a set of computer programs transforms URCS Master File data and statistical outputs from Phase I into railroad unit costs. The computer programs generate a series of "worktables" that reflect specific tasks or calculations: Worktable A contains input data; Worktable B records various allocations, capital costs, and reconciles the R-1 schedules; in Worktable C, the URCS variability factors are calculated; in Worktable D, the unit costs are calculated; and Worktable E summarizes unit costs and operating statistics. The resulting unit costs provide the factors used to derive the system-average costs associated with specific rail activities.

In **Phase III**, the variable costs associated with particular rail movements are generated. A computer program permits a user to specify the particulars of a given shipment, such as the commodity being transported, the number and type of cars in a movement, the carrier (or carriers) handling the shipment, and the movement length. The program estimates the number of locomotive unit miles, the number of switch engine minutes, etc., that a particular movement requires, and it multiplies these quantities by the unit costs developed in Phase II, to calculate the cost of the movement.

Figure 1: URCS Phases
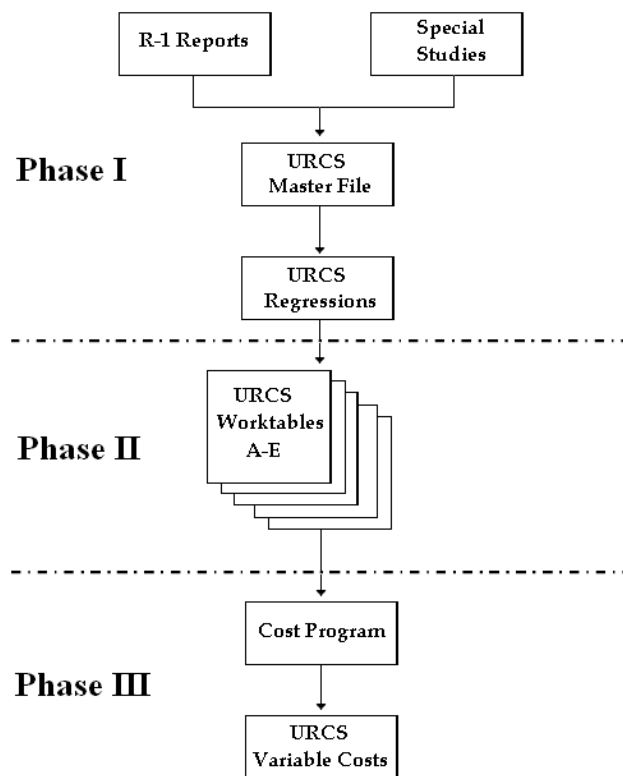
2. How the Board Uses URCS

URCS is used in a wide variety of Board proceedings. The most prominent use of URCS is in cases where a shipper has challenged the common carrier rate charged by a railroad as

unreasonably high.[14] The Interstate Commerce Act (ICA) provides that the Board has jurisdiction to entertain rate challenges only if the rail carrier has "market dominance" – i.e., where there is a lack of effective competition from other rail carriers or other modes of transportation – over the transportation at issue.[15] The statute directs the Board to conclude that a carrier lacks market dominance (and therefore that the Board lacks jurisdiction) if the rail carrier proves that the revenue it derives from the challenged rate is less than 180% of its variable cost of providing the transportation (referred to as the revenue/variable cost ratio or R/VC).[16] The Board uses URCS to determine what the variable costs of a movement are in order to make this threshold determination.[17]

The Board also uses URCS at later stages of its railroad rate proceedings to determine whether the challenged rate is reasonable and, if necessary, to prescribe the maximum rate that can be charged. In rulemakings completed in 2006 and 2007, the Board increased its reliance on URCS across the spectrum of rate cases it adjudicates.

In the largest rate cases, which use the Board's Stand-Alone Cost (SAC) methodology, URCS is used to allocate revenues and set reparations, if needed. The Board adopted its Average Total Cost (ATC) methodology that uses URCS variable costs to allocate revenues from cross over traffic.[18] The Board also uses URCS variable costs in its Maximum Markup Methodology (MMM) to determine what reparations are due to the complainant when a rate is found to be unreasonable.[19]

In medium-sized rate disputes, the Simplified SAC methodology uses URCS in the ATC and MMM methodologies as described above.[20] In addition, Simplified SAC uses URCS to develop the total operating expenses for the SARR.[21]

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[14] Only common carrier rates (often referred to as tariff rates) may be challenged at the Board under 49 U.S.C. § 10702. The Board does not have jurisdiction to adjudicate the reasonableness of a railroad rate that is the subject of a contract between the rail carrier and a purchaser of rail services. 49 U.S.C. § 10709.

[15] 49 U.S.C. § 10707. For example, if the shipper is transporting a commodity from Point A to Point B, a rail carrier has market dominance if there are no other methods of transporting that commodity, including trucks, barges, and other railroads, that compete effectively for that movement.

[16] 49 U.S.C. § 10707(d)(1)(A).

[17] 49 U.S.C. § 10707(d)(1)(B).

[18] Major Issues in Rail Rate Cases, EP 657 (Sub-No. 1), slip op. at 24-39 (STB served Oct. 30, 2006) (defining "cross-over traffic" at 24), aff'd, BNSF Ry. v. STB, 526 F.3d 770 (D.C. Cir. 2008).

[19] Id. at 9-23.

[20] Simplified Standards for Rail Rate Cases, EP 646 (Sub-No. 1), slip op. at 15-16 (STB served Sept. 5, 2007), aff'd CSX Transp., Inc. v. STB, 568 F.3d 236 (D.C. Cir. 2009), vacated in part on other grounds, CSX Transp., Inc. v. STB, 584 F.3d 1076 (D.C. Cir. 2009).

[21] Id. at 16.

Finally, in the smallest rate disputes, the Three Benchmark (3B) methodology compares the R/VC ratio of the challenged rate against the R/VC ratios for other comparable traffic on that railroad to determine whether or not the challenged rate is reasonable.[22]

URCS is also used when a carrier seeks Board authorization to exit a market (i.e., "abandon" or "discontinue" service on a rail line). In such proceedings, the Board considers the "avoidable cost" of the line sought to be abandoned. Avoidable costs are the expenses that the rail carrier would not incur if it stopped providing transportation over the line.[23] These avoidable costs are compared against actual and potential revenues to determine whether maintaining service over a line is economically feasible. The Board uses URCS to calculate the line's avoidable cost.

The Board also uses URCS in proceedings where it must determine the compensation due to an incumbent railroad when the Board directs that another railroad may operate on the incumbent's lines or whenever there is a regulatory need to value a rail line, such as for an offer of financial assistance for a rail line proposed to be abandoned.

3.   Prior Attempts to Update URCS

It was always the intent of Congress, the ICC, and the RAPB that URCS be reviewed and updated periodically in order to ensure that it continues to produce accurate system-average costs even as the rail industry evolves over time. The RAPB's Final Report to the ICC recommended that the "[g]eneral-purpose costing systems used by railroads should be reviewed not less than every three years for potential updating through a formal process permitting all interested parties to participate."[24] And in its decision adopting URCS, the ICC called for the first review to occur within two years.[25] In the ICC Termination Act of 1995 (ICCTA), Congress required that the Board "periodically review its cost accounting rules and . . . make such changes in those rules as are required to achieve the regulatory purposes of [the rail portions of the ICA]."[26]

Unfortunately, exhaustive review of URCS within the resource constraints of both the ICC and now the STB has proven elusive. Although the agency has attempted to update URCS several times, no exhaustive review of the methodology underlying URCS has yet occurred. The Board attributes this primarily to financial and staffing constraints.

a.   Review in 1990s

The ICC initiated a proceeding to review URCS within two years of its adoption. The agency solicited comments on: (1) the aggregation of expense categories; (2) the treatment of data for railroads that merged during the observation period; (3) economic and statistical issues,

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[22] Id. at 16-22.

[23] 49 U.S.C. § 10904.

[24] RAPB Final Report, Executive Summary at iii.

[25] Adoption of URCS, 5 I.C.C.2d at 900, n.16. Dr. Westbrook also believed that work on URCS would continue after its adoption, including statistical adjustments and future exploration of relaxing the linearity of URCS. See Westbrook Report at 54.

[26] 49 U.S.C. § 11161.

including the regression analysis used to develop variability factors; (4) whether further engineering studies and other non-regression data should be performed; (5) the proper time horizon for determining the extent to which capacity-related costs are fixed rather than variable; and (6) any other relevant issues suggested by commenters.[27]

After receiving comments, the ICC declined to make fundamental changes to the underlying statistical methodology. The ICC explained that its evaluation of the regression analysis, and the comments regarding it, had required more time than anticipated in this "technically difficult process."[28] Declining to rush its completion, the ICC instead decided to limit its review to proposed modifications to the statistical procedures that underlie the URCS variability study *database*. These included several of the issues listed above (e.g., account groups and merged railroads), as well as several new issues, such as: (1) the inclusion of Conrail data;[29] (2) evaluation of outliers (i.e., those Class I rail carriers whose expense data fell outside of the range of normal rail operations); (3) use of a root mean squared error of forecast;[30] (4) use of a weighted average default variability factor;[31] (5) discontinuance of "plan 40" box car reporting;[32] (6) a unit cost updating procedure; (7) an updated Train Switching Conversion factor; (8) allocation of switching and terminal data to individual carriers; and (9) revisions to the treatment of trailer-on-flatcar and container-on-flatcar (TOFC/COFC) in URCS Phase III.[33]

In 1997, the Board concluded the review of URCS begun seven years earlier by the ICC with a decision recognizing that the project "ha[d] not been a simple task."[34] Perhaps most significantly, although it recognized that the engineering studies underlying URCS were conducted many years ago, the Board determined that it could not undertake any updates to those

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[27] Review of the Gen. Purpose Costing Sys., EP 431 (Sub-No. 2) (ICC served Jan. 11, 1990 & Sept. 25, 1990).

[28] Review of the Gen. Purpose Costing Sys., EP 431 (Sub-No. 2), slip op. at 1 (ICC served Apr. 20, 1995).

[29] The Consolidated Rail Corporation, referred to as Conrail, was created by Congress in the Regional Reorganization Act of 1973 to operate the lines of several bankrupt railroads in the Northeast. Most of its assets were divided between NS and CSXT. CSX Corp.—Control & Operating Leases/Agreements—Conrail, Inc., 3 S.T.B. 196 (1998). The remaining Conrail assets are now jointly controlled by NS and CSXT.

[30] The root mean squared error of forecast is a metric that expresses how well the regression fits the data (with a lower error of forecast meaning a better the fit).

[31] A single weighted average default variability factor would be an assumed value for those expense account groupings that are not regressed (e.g., return on road property investment). So rather than using multiple variability factors for these groupings, as URCS currently does, there would be a single all-inclusive variability factor used for all.

[32] The 40 foot box car is a discontinued car-type.

[33] TOFC/COFC traffic moves in containers that are especially designed to be easily transferred between railroads, trucks, and ocean vessels.

[34] Review of the Gen. Purpose Costing Sys., 2 S.T.B. 659, 661 n.7 (1997).

studies at that time. The Board cited the expense and time-consuming nature of nationwide studies of railroad operations and the agency's "limited budget and staff resources."[35] It also noted that the ICC had proposed a new engineering study in the 1980s that would have examined railcar switching operations, but that the cost of that study (estimated then at $1 million) proved prohibitive.

The Board's 1997 decisions made several, more modest, updates to URCS. First, the Board's October 1997 decision modified the costing procedures for TOFC/COFC traffic, recognizing that the movement of containerized freight had undergone a revolution since the late 1960s when the intermodal switching study underlying URCS was done. The Board also stopped treating TOFC/COFC traffic as a single-car movement and began applying to TOFC/COFC certain of the volume adjustments that it applied to trainload traffic.[36] These volume adjustments reduce estimated costs to account for the fact that unit-train and TOFC/COFC movements are more efficient and thus have a lower per car (unit) cost than other traffic.[37] The Board's December 1997 decision also lowered the "spotted-to-pulled"[38] ratio for TOFC/COFC cars to account for the fact that intermodal cars spend more time loaded (in revenue mode) than they do empty compared to cars carrying other types of traffic. It also updated the Train Switching Conversion Factor, modified the costing of RoadRailer operations, and made changes to the methodology for determining the variable cost of using privately owned rail cars.[39]

b. Review in 2009

In 2009, the Board initiated two proceedings aimed at updating URCS. First, in an Advance Notice of Proposed Rulemaking (ANPR), the Board sought comments on whether it would be appropriate to update URCS to better capture the operating costs of transporting

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[35] Id. at 661.

[36] A trainload movement is a multi-car shipment of at least 50 cars. Coal unit-train movements often consist of more than 100 cars that stay together as a "train set" and are referred to as unit-train movements.

[37] The volume adjustments include: (1) a 75% reduction in origin and destination switching costs; (2) a 50% reduction in interchange costs; (3) elimination of way train costs, and, in the case of trainload movements only: (4) a 25% reduction in station clerical costs for each car; and (5) a change in the assumption that inter- and intra-train switching costs occur every 4,163 miles instead of every 200 miles. Way train refers to trains operated primarily to deliver or pickup cars between local way stations and classification yards.

[38] A revenue car is spotted when it is placed on the property of the shipper or consignee for unloading. It is pulled when it is removed from that property empty. A spotted-to-pulled ratio of 1.5 assumes that 50% of the time cars are pulled empty.

[39] The Train Switching Conversion Factor converts the wages for all road train crews across carriers to a common mileage basis. RoadRailer operations involve the movement of highway trailers with retractable or detachable rail wheels directly over the tracks of the rail system. Review of the Gen. Purpose Costing Sys., 2 S.T.B. 754, 756 n.6 (1997).

hazardous materials.[40] The ANPR indicated that there might be unique costs associated with transporting hazardous materials (such as higher insurance premiums) and that URCS currently spreads those costs across all traffic of a railroad rather than allocating them more directly to hazardous materials movements. The Board also solicited comments on how it could identify the costs of hazardous materials operations through the Board's accounting and reporting rules. Comments to the ANPR have been received and the proceeding remains pending at the Board.

Second, in April 2009, the Board noticed a public hearing to solicit comments on whether it should embark upon a comprehensive review of URCS.[41] The hearing notice solicited comments on a broad range of difficult URCS issues, including the historical special studies, treatment of TOFC/COFC and unit train movements, and the Train Switching Conversion Factor. It also sought comment on the various statistical relationships used in URCS, including the variability factors for URCS expense groupings. In response to its notice and hearing, the Board received comments from a wide variety of interests including railroads, shippers, government agencies, economists and transportation analysts. We discuss the general themes of the substantive comments in Part II, which explores criticisms of URCS. The URCS public hearing docket, which was for information gathering purposes, was discontinued in January 2010.[42] Since then, the Board has continued its internal review of URCS.

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[40] Class I R.R. Accounting & Fin. Reporting—Transp. of Hazardous Materials, EP 681 (STB served Jan. 5, 2009).

[41] Review of the STB's Gen. Costing Sys., EP 431 (Sub-No. 3) (STB served Apr. 6, 2009).

[42] Review of the STB's Gen. Costing Sys., EP 431 (Sub-No. 3) et al. (STB served Jan. 19, 2010).

PART II: CURRENT EVALUATION OF URCS

Even though URCS produces numerical results, costing railroad operations is an art as well as a science.[43] That is because the development of system-wide variable costs associated with a particular rail movement requires that any costing methodology incorporate many assumptions and generalizations about railroad operations. The costing system is only as good as those assumptions, the appropriateness of which can change over time. Accordingly, the Board remains committed to seeking the resources it needs to review URCS.

In its FY2010 budget request, the Board requested additional appropriations to allow it to begin a review of URCS, advising the Committee that it anticipated that the review would take several years and require additional funding in subsequent years. The Congress's FY2010 budget allocated $350,000 in additional funding for the Board to begin scoping the URCS update process. The Board has used that funding to hire a transportation econometrician as a temporary Board employee to supplement the Board's existing econometric capabilities and to dedicate STB Section of Economics' staff to the URCS project.[44] The goal of the URCS team is to assess recent and longstanding criticisms of URCS and to evaluate both URCS and the alternative costing models described in Part IV.

A. Assessment of URCS Criticism

There have been criticisms of URCS since it was adopted in 1989. The ICC recognized the validity of some of those criticisms at the time of URCS' adoption but nonetheless determined that URCS represented a significant improvement over Rail Form A. The Board's 2009 public hearing on URCS provided the most recent opportunity to solicit broad-based comments regarding URCS. We summarize the themes of the most common criticisms and provide our assessment of those criticisms below.

1. Statistical and engineering methods used by URCS are outdated.

One pervasive criticism of URCS is that it has become outdated. Numerous parties, including the U.S. Departments of Transportation and Agriculture, have urged the Board to conduct a comprehensive review of URCS to determine those elements of the model that require updating in order to produce more accurate results.[45] The chief argument is that the statistical

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[43] Review of the Gen. Purpose Costing Sys., 2 S.T.B. at 659.

[44] The Board hired Dr. Wesley Wilson on a temporary basis to assist the Board in its efforts to evaluate costing system methodologies. Dr. Wilson is a professor of Economics at the University of Oregon, specializing in transportation and applied econometrics. He has published widely in the transportation field and is the former President of the Transportation and Public Utilities Group of the American Economics Association. Dr. Wilson's team included two part-time research assistants.

[45] Many other parties with diverse perspectives also endorse this view, including Class I railroads BNSF Railway and Union Pacific Railroad; shipper interests Montana Wheat & Barley Committee and Arkansas Electric Cooperative Corporation, and transportation analysts Dr. Gregory Bereskin and Robert Leilich.

relationships used in URCS, including the Westbrook regressions, have not been reviewed in many years. Interested parties also point out that URCS relies on special studies that date back to the 1930s-1960s and most likely do not reflect current railroad operations.

The Board believes that a review of the statistical relationships and the special studies used in URCS is an important step in ensuring that URCS costs continue to be as reliable and accurate as practicable. While a comprehensive review of the statistical relationships could lead the Board to propose significant changes to URCS, it could also reaffirm the decision to use many of URCS' existing variability factors. With regard to the special studies and the engineering relationships underlying URCS, it is certainly true that nationwide studies of railroad operations have not been conducted for many years and those used in URCS might not represent current railroad operations as accurately as possible. As discussed in Part III, it is not yet clear, however, which special studies warrant the expense of updating. Should the Board maintain URCS as its general purpose costing system, it may become necessary to revisit both the special studies and the underlying URCS regressions.

## 2.	There are fundamental flaws in URCS and its underlying data that make it less suitable for use as a railroad costing system.

Some parties argue that a system-average regression model might be inappropriate for estimating the cost of specific movements. Others argue that URCS' linear regressions are not sufficiently reflective of actual railroad costs, that the Board should test functional forms other than linear, and that the Board should take traffic density and productivity into account. Many advocate that particular variability factors should be changed or better supported by econometric analysis, with the most common targets of criticism being the default variability factors. Some also claim that the R-1 operating statistics used in URCS are "flawed."

In addition, an independent report commissioned by the Board opined that the URCS based R/VC ratios were only weakly correlated with other measures of market power.[46] The Christensen Report noted that a large number of rail shipments moved at R/VC ratios either below 100 percent or above 300 percent, suggesting to Christensen that there are R/VC extremes because variable costs are not closely aligned with shipment costs.[47]

Many of the criticisms go to the fundamental structure and functions of URCS. But these would only be appropriate to explore in an exhaustive review of URCS if undertaken, just as the ICC reviewed them when it considered whether to adopt URCS in the first place. Several of the URCS expense category variability factors that have proven most problematic were the ad hoc "default" factors (i.e., not based on regression analysis) adopted reluctantly by the ICC in 1989, for example, the 50% variability factor of road property investment. The ICC recognized at the time that while stakeholder arguments against adopting default variables had "some merit," the

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[46] A Study of Competition in the U.S. Freight Railroad Industry and Analysis of Proposals that Might Enhance Competition, Laurits R. Christensen Associates, Vol. 2, at 11-24 (November 2009) (Christensen Report). The report is available on the STB's website at stb.dot.gov/stb/elibrary/CompetitionStudy.html.

[47] Id.

agency lacked a sufficient empirical foundation to act otherwise.[48] The ICC (incorrectly as it turns out) anticipated that it would be able to build a more complete record and fully address these factors in its first review of URCS.[49]

3.   Certain elements of URCS should be revised to better reflect actual railroad costs.

Over the years, parties have made many suggestions for revisions to URCS, several of which have resulted in the initiation of Board proceedings (e.g., the changes to TOFC/COFC costing in the 1990s and the pending ANPR considering hazmat costing). Other suggested changes to URCS or the way URCS is used have been rejected by the Board (e.g., allowing parties to adjust URCS calculations in individual rate cases to reflect the movement-specific, rather than system-average, cost of providing a particular service). More recently, in the April 2009 public hearing on URCS, parties submitted comments requesting that URCS be revised to, among other things: (1) use replacement costs;[50] (2) allow carriers to submit costs to the Board using their internal railroad accounting procedures rather than the USOA;[51] (3) change the cost treatment for privately owned railcars; (4) improve the make-whole adjustment; (5) change the treatment of fuel surcharges; and (6) adjust the circuity factors.[52]

There are likely to be as many requests for small revisions to URCS as there are parties with interests in the outcomes of regulatory proceedings that use URCS. Some of the proposed revisions have been addressed by the Board in prior proceedings. Others are new proposals, which can be further developed within the framework of a more extensive URCS review.

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[48] Adoption of URCS, 5 I.C.C. 2d at 919-20.

[49] Id. at 920.

[50] A "replacement cost" methodology judges the value of an asset based on the current cost to replace it with a similar asset. In contrast, the "book value" methodology determines value of an asset based on the original price paid for the asset less depreciation. The Board uses book value in making most regulatory determinations, (e.g., whether a rail carrier is earning adequate revenues as defined by 49 U.S.C. § 10704) because it has not yet identified a practical way to estimate the current value of individual assets in the rail industry given the absence of actual comparable transactions. See Ass'n of Am. R.R.—Petition Regarding Methodology for Determining R.R. Revenue Adequacy, EP 679, slip op. at 2 (STB served Oct. 24, 2008).

[51] Railroads do not use the USOA for their internal accounting. Rather, they use proprietary accounting systems and then translate those costs to the USOA. There is no standard railroad accounting system in the business world and each railroad is free to use whatever system it chooses.

[52] The circuity factors account for the extra distance a railroad car travels in excess of the shortest possible route between two points. It is only used in URCS Phase III costing if the actual miles are not known.

B. Evaluating URCS' Underlying Data and Programming

In addition to developing the options for updating URCS described in Part III of this report, the Board has undertaken an extensive review of the data and processes used to create URCS. The Board is replicating the legacy programs and regressions underlying URCS in order to better assess them, and to consider improvements to the datasets. The following describes the steps the Board has taken to prepare for a review of URCS.

1. Historical R-1 Database

During the past year, the STB has carefully examined the R-1 schedules that are used in Phases I and II of URCS to confirm their accuracy and appropriateness. As a result of this review, the STB has created an updated electronic historical database containing "as-filed" R-1 data (for selected schedules) from 1983 to 2008.[53] This expanded time series includes all railroads that were categorized as Class I and submitted a complete R-1 form containing 12 months of data for a particular year. The Board envisions that these data will be posted on the STB website and could be used by practitioners and academics for research purposes.[54]

2. URCS Input Data

The Board reviewed and updated the computer programs used to create URCS input data, reflecting the more sophisticated programming and computational methods available to the Board today than at the time of URCS' adoption and development.[55] The Board also mechanized certain processes that were previously performed manually.[56] These changes have considerably increased the transparency and accuracy of the data found in the URCS Master File and URCS Worktable A.[57]

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[53] In 1983 the industry adopted depreciation accounting in place of betterment accounting. Therefore, the industry accounting data from before 1983 is not strictly comparable to the 1983 and later data.

[54] This dataset will slightly differ from the data currently used in the first two phases of URCS for three reasons: (1) expense data are not indexed for inflation by the Railroad Cost Recovery Index provided by the AAR; (2) special charges are not removed from the data; and (3) the carrier may have revised a particular year's data in the following year(s).

[55] For example, the Board replaced the program that compiles URCS data into the URCS Master File and improved the calculation of inflation indices.

[56] For example, R-1 used to be manually entered by the Association of American Railroads, the industry's trade association, and then manually audited by the Board, a process that was error prone. The Board has now limited the amount of manual inputs. The Board also developed mechanized procedures for non-R-1 data such as loss and damage reports, quarterly commodity statistics, and CS-54 (an annual report filed with the STB providing origination and termination information for cars loaded and unloaded by car type).

[57] The URCS Master File contains all of the URCS input data. URCS Worktable A contains a collection of the data required by the other Phase II worktables. Every year, the STB posts URCS worktables on its website.

3.   URCS Worktable C

URCS Worktable C contains computations of variability factors based on the output and capacity parameter estimates from the URCS regressions. As discussed earlier, these regressions incorporate 15 different expense account groupings, which are based on the operating expenses reported by the railroads. Over the last year, the Board independently replicated the Westbrook regressions for each expense account grouping to better understand some of the issues raised in the Board's most recent hearing on URCS.

4.   URCS Indices

Finally, the STB has independently verified the calculation and application of the inflation indices that URCS uses to put various expenses in current dollar terms.

Each of the preparatory steps listed above will greatly aid the Board in a review and update of URCS.

PART III: OPTIONS FOR UPDATING URCS

In its Report, the Committee requested that the Board identify a range of solutions consisting of at least three cost-effective options – Basic, Moderate, and Comprehensive – for updating URCS. In this section, we describe the potential options, identify the advantages and disadvantages of each, and provide estimates of the resources needed to pursue them. Because the Board has merely scoped the options for updating URCS – some of which require further sensitivity testing to determine the magnitude of the project – we cannot yet identify every resource challenge the Board might face in pursuing any particular strategy. Accordingly, this report provides preliminary cost estimates for more efficient options for updating URCS.

The Board's goal in this report was to examine potential modifications to URCS that could increase its functionality and accuracy. Based on its review, the Board believes that the most appropriate option to pursue at this time is the Moderate Option described at pp. 22-24. Under the Moderate Option, the Board would consider a number of targeted changes to URCS' programming and methodology to make it more accurate and user-friendly. The Moderate Option stops short of considering the major changes to the underlying fundamentals of URCS as these changes would be very costly and time-consuming.

The Board has also begun a study of alternative costing models to determine whether they have the potential to generate appropriate costs estimates, are more self-updating than is URCS, and better utilize of the wealth of revenue data that the Board already maintains. Based on its preliminary review, the Board sees potential in two alternative models. But we also recognize that a complete departure from URCS presents its own risks, such as concerns about theoretical underpinnings, suitability to railroad costing, and disruptions to the regulatory process. Because the Board's scoping of non-URCS costing models is just beginning, Part IV of this report describes how the Board intends to continue its examination of alternative costing models as it simultaneously considers moderate updates to URCS.

We stress that in requesting funding to pursue the Moderate Option, the Board has not yet adopted any particular change to URCS, nor has it foreclosed other options that have been or may be suggested by stakeholders during the course of any URCS review. Future determinations to adopt changes to URCS would only be made after the appropriate administrative processes and Board consideration of comments filed by interested parties. Moreover, should the Committee decide to fund the Board's consideration of URCS changes and the Board ultimately decide not to adopt an alternative costing methodology, an exhaustive review of the URCS statistical regressions and special studies may become necessary in the future.

A.   Basic Option

Under a Basic Option, the Board would update the legacy computer programs currently used in URCS, thereby providing for more accurate and transparent data. The Board could also consider revisiting the make-whole adjustment, updating the USOA to more directly reflect hazardous materials movement costs, and make changes to other railroad reporting requirements. The four components of the Basic Option are discussed below.

1.   Description

a.   *Update Legacy Computing Programs*

The general computing architecture and platform of URCS has remained largely unchanged for more than 20 years despite the substantial advancements in computer technology since 1989. URCS programs were originally developed for mainframe computers. These mainframe computers lacked the speed, storage space, power, and flexibility of modern computers. The URCS program was initially structured to account for those mainframe limitations and, as a result, URCS uses a number of computer programs, some of which are now obsolete. For example, URCS still uses the FORTRAN programming language, even though the Board currently uses Visual Basic Access for many of its database management applications.[58]

The calculations and flow of the URCS computer programs are critical to the accuracy of the estimated costs and the continued use of older and less transparent programs reduces the Board's ability to spot and correct calculation errors. Revisions to the legacy computing programs would increase URCS' functionality and accuracy.[59]

The Board believes that both it and stakeholders would benefit from a re-programmed URCS that uses modern computer languages, has fewer component pieces, and is simpler to execute. Use of updated computer programming would also make URCS more adaptable to modification, as necessary.

b.   *Revisit the Make-Whole Adjustment*

The make-whole adjustment is used to redistribute the efficiency savings that a railroad obtains in higher-volume shipments across all of that carrier's lower-volume shipments.[60] Currently, the Board uses a three-step process in applying the movement costing portion of URCS to estimate the cost of each shipment in the Waybill Sample. The first step computes the cost of each movement as if it were a single-car shipment and does not account for the extra efficiencies that result from trainload, unit train, and multi-car shipments. Because the costs associated with switching, circuity, and way train are less for these higher-volume shipments than they are for single-car shipments, the agency makes an appropriate efficiency adjustment.

In the second step, the agency applies appropriate efficiency adjustments to the volume shipments in the Waybill Sample to account for their lower costs. The cumulative amount of the efficiency adjustments is called the "shortfall." The third step spreads this "shortfall" over the single-car movements, increasing the cost of each of these movements, resulting in the make-whole adjustment. The make-whole adjustment allows for the efficiency adjustments while

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[58] URCS also uses other programming languages such as C++, VB Net and VB 6.

[59] The most significant task associated with updating the legacy computer systems would be the necessary recoding of the URCS Phase II worktables.

[60] The efficiency savings arise because the costs associated with switching, circuity, and way train are less for higher-volume shipments than they are for single-car shipments. Investigation of R.R. Freight Rate Structure—Coal, EP 270 (Sub-No. 4) (ICC served Mar. 14, 1975).

maintaining the same URCS total variable costs across all shipments derived from the R-1 data. Thus, the URCS total variable costs are "made whole."

There is some concern among stakeholders that the make-whole adjustment does not accurately reflect current railroad operations. Railroads have been encouraging shippers to move product in longer trains, which the railroads can move more cost-effectively and thus better utilize assets. This is particularly true in coal, grain, and intermodal markets.

Because more traffic moves in volume shipments, there are ever-fewer single-car shipments left to absorb the "shortfall," a value that increases with the number of volume shipments. Accordingly, a study of this issue might reveal that the current method for allocating the "shortfall" and modern shipments practices results in an upward distortion of the single-car shipment variable costs. In an extreme hypothetical, if only one shipment were transported as a single car shipment, resulting in a large shortfall, all of the shortfall costs would be added to that lone single-car shipment, providing a nonsensical result.

Should the Board determine that the make-whole adjustment warrants revision, one potential change could be to allocate the shortfall to all shipments, not just the single-car shipments. This would result in smaller cost reductions for the volume shipments (as they get some of the shortfall added back to them) and smaller cost additions to the single-car shipments (because a portion of the shortfall is set aside and added back to the volume shipments instead). Therefore, if unit trains constitute the overwhelming majority of a carrier's traffic, they will closely resemble the system average and URCS will not overly burden the few single-car movements with a large cost allocation.

c. Toxic Inhalation Hazards & Hazardous Materials

In recent years, rail carriers have questioned whether URCS properly allocates the costs assigned to hazardous materials and especially dangerous hazardous materials such as chlorine and anhydrous ammonia, which are Toxic Inhalation Hazards (TIHs). The primary question is whether URCS takes into account any particular handling and separable requirements of TIH movements, or the risk and insurance costs directly associated with these movements.

In an ANPR pending at the Board, the agency sought comment on whether it would be appropriate to update URCS to better attribute costs to the specific hazmat movements, and how to identify the costs of hazmat operations.[61] Any change to URCS to account for hazmat transportation costs may involve obtaining more detailed accounting and reporting of expenses and operating statistics associated with hazmat transportation from the railroads, and developing methods to calculate system average unit costs and operating statistics. The Board is currently evaluating comments submitted in response to the ANPR and as yet has made no determination about whether to pursue a rulemaking on this issue.[62] The Basic Option would include further analysis of this issue.

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[61] Class I R.R. Accounting & Fin. Reporting—Transp. of Hazardous Materials, EP 681 (STB served Jan. 5, 2009).

[62] The Board also recently proposed a rule that would require railroads to report all of their TIH movements in the Waybill Sample. Waybill Data Reporting for Toxic Inhalation Hazards, EP 385 (Sub-No. 7) (STB served Jan. 28, 2010).

d.   *Railroad Reporting Requirement Changes*

In hearings before the Board, stakeholders identified a number of modifications to the railroads' reporting requirements that would automatically flow through into the costs developed by URCS. These include changes in how the railroads report intermodal (TOFC/COFC) expenses and operating statistics and changes to reporting statistics on new car types, among others. Should the Board decide to adopt such R-1 reporting changes, they could be relatively easily incorporated into the existing framework of URCS.

2.   **Costs and Analysis**

a.   *Costs of the Basic Option*

Because some of the components of the Basic Option are already under consideration by the Board, a portion of the costs associated with pursuing the Basic Option would be subsumed in the Board's current operating budget (e.g., TIH-related changes to URCS). However, should the Board determine that it will pursue the Basic Option in its entirety, the most significant external cost to the agency would be the extensive update of the legacy computer programs and any changes to URCS programming required by a Board decision to modify the treatment of any URCS cost category. The Board would require the services of a programming firm or contractor to assist in the re-design of URCS' programming platform. The Board would also need to acquire additional hardware and software licenses for those Board employees who work with URCS. We estimate these external costs would be approximately $550,000 in 2010 dollars.

The Basic Option would require continuation of the Board's in-house URCS team for a period of at least two years, and the addition of STB information technology professionals to the team. These key employees would focus nearly all of their time on URCS, and thus would not be available to work extensively on other agency matters.

b.   *Pros and Cons of the Basic Option*

Consideration by the Board of the Basic Option would address certain areas of stakeholders' past concerns with URCS and could make URCS better able to attribute the costs of transportation to the activities incurring those costs. In addition, the Basic Option might provide a solution that is less disruptive to regulatory processes than the more extensive options discussed in the Moderate and Comprehensive sections below. The majority of the changes outlined in the Basic Option, if warranted, could be accomplished using mostly the existing STB staff. The changes would be relatively inexpensive to the Board and could be implemented relatively quickly following appropriate administrative procedures.

The main drawback of the Basic Option is that it would still employ the URCS regressions that were developed in the 1980s over the same historic dataset. The STB therefore would not be considering more modern, and potentially more powerful, econometric techniques, which might generate more accurate estimates of the variable costs of particular railroad activities. Finally, the Basic Option would not address the concerns regarding the use of old engineering studies.

B.   Moderate Option

1.   Description

The Moderate Option to update URCS would include all aspects of the Basic Option with consideration of two significant additional changes: re-estimating the URCS regressions using a newly updated dataset (employing data from 1983-2008); and re-evaluating and potentially changing the assumptions regarding the treatment of railroad mergers used in developing the 1979-87 database (i.e., the years included in the original URCS regression database).

a.   *New Time Series (1983-2008)*

The original URCS regressions were estimated using data from an 8-year period (1979-1987) across the 14 Class I railroads existing at the time.[63] In order to account for the decline in the number of railroads due to consolidation, the original URCS methodology consolidated the data of railroads that would eventually join together during the years prior to their mergers.[64] This translates to a total number of 126 observations used to estimate the regression equations (14 railroads multiplied by 9 years). Given that this dataset ends in 1987 and includes railroads that have since merged with others, the original URCS regression estimates may not reflect the current railroad industry.

Additionally, in 1983, there was a change from betterment to depreciation-based accounting in the railroad industry.[65] To avoid any issues arising purely from the betterment-to-depreciation change in accounting methodology, the Moderate Option would re-estimate the URCS regressions using the updated R-1 database from 1983 to 2008. This approach would replicate Westbrook's original methodology but over a much longer time period (albeit with a decreased number of Class I rail carriers). This would result in 182 observations that could be used to estimate the regression equations (7 railroads multiplied by 26 years), an increase of 56 observations over the current method.

b.   *Reconsider the Treatment of Merged Firms*

The Moderate Option would also revisit the original URCS approach to merged railroads and examine the potential impact of maintaining pre-merger firms as separate entities in the

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[63] In 1987, there were actually 18 Class I railroads but the URCS regression database excluded four of these railroads because of size and/or special circumstances which caused them to differ from the other Class I railroads. These railroads included Conrail, Delaware and Hudson, Boston and Maine, and Florida East Coast.

[64] Between 1979 and 1987 (the years included in the original URCS regression database), the railroad industry experienced a number of mergers, reducing the number of Class I carriers from 41 to 18. To maintain consistency in the URCS regression database, the R-1 data for the carriers that eventually merged were added together, creating merged historic data for predecessor railroads. The URCS regression database therefore reflects simple aggregation of historic reported data (for the carriers that merged or filed consolidated reports).

[65] Using betterment accounting methods, long-term investments often were included as expenses. Under depreciation-based accounting standards, such items are depreciated and only a portion of the investment is included as expenses.

URCS regression analyses. Due to merger-related efficiencies, the firm formed after a merger could theoretically have a very different cost structure from its pre-merger railroads. Therefore, treating the pre-merger entities separately would acknowledge that the merged entity is not just the sum of its parts.

There might also be a practical statistical benefit to maintaining pre-merger firms as separate entities in URCS. It would provide for more observations on which to base the regressions. By maintaining the pre-merger firms as separate entities the number of usable observations upon which the regressions are based would increase by approximately 40%, potentially strengthening the results of the regression estimates.

2.   Costs and Analysis

a.   Costs of the Moderate Option

Consideration of the Moderate Option would entail all of the costs listed in the Basic Option, with the addition of an outside econometric consultant to assist with validating the updated URCS regressions and re-estimating the URCS regressions over the new panel dataset. Although the Board has in-house econometric expertise, it believes that utilization of an outside consultant, as the agency used in 1987 when it hired Dr. Westbrook during Adoption of URCS, would help the agency more efficiently consider issues likely to be raised during notice and comment. We estimate the additional external costs associated with the limited use of an econometric consultant over the course of 2 years to be $75,000, bringing the total cost of the Moderate Option to $625,000 in additional funding (in 2010 dollars).

b.   Pros and Cons of the Moderate Option

Consideration of the Moderate Option would address some of the concerns about URCS' oversimplification of merged firms. The Moderate Option would also incorporate more recent data to address the concern that the results of the Westbrook Report on the URCS regressions have become stagnant in the modern railroad industry.

As noted above, by treating firms that eventually merge as separate entities until the actual merger, URCS would expand its cross-sectional observations, which could in turn increase the reliability of its regression estimates. Empirically, it is usually desirable to incorporate all available information in a model. The larger the number of observations, the greater the degree of confidence in the regression estimates.

There are some disadvantages to limiting an URCS review to just the components of the Moderate Option. First, there is no guarantee that the approach would provide estimates of relationships that make sense logically and empirically. If the updated regression results appear to be inconsistent with logic, theory, or the current URCS results, the Board would need to consider whether further, more comprehensive changes to URCS are necessary. Second, treating each pre-merger firm as a separate entity may be problematic because it could lead to outliers in the dataset.[66] There could be systematic differences in the cost/output relationships of merger

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[66] An observation (or a set of observations) that appears to be inconsistent with the remainder of the dataset. Tests to determine whether or not outliers matter ask the question whether the inclusion of additional observations would yield significantly different results in a regression analysis.

partners that are very different from those of a firm that remains independent. These differences could be modeled but such modeling may require the Board to move away from using the techniques used by Dr. Westbrook. The Moderate Option does not provide for in-depth analysis and resolution if the regression estimates on more recent data – while relaxing the underlying assumptions – provide unreasonable results.

Finally, the Moderate Option does not address the criticisms of URCS regarding the specifications of the underlying regressions, the default variability factors, and the special engineering studies used in URCS.

C.   Comprehensive Option

1.   Description

The Comprehensive Option for updating URCS would include all aspects of the Basic and Moderate options plus two additional components. The first additional component involves evaluating, updating, and potentially replacing the URCS regression equations. The second additional component would examine the engineering special studies used in URCS.

a.   *Changes to the URCS Regression Equations*

This component would involve an extensive review of the methodology used to estimate the URCS variability factors, including both those variability factors that are currently derived from regressions and those that are default factors. In short, the STB would identify and estimate new cost equations for a series of potentially new rail expense accounts. Each cost equation would be estimated separately, relating levels of costs to measures of intermediate rail activity (output) and size/capacity of the railroad. The estimates from these equations would then be used to calculate new variability factors.

i.   *Expense Account Groupings*

Expense account groupings and their relationships to the output and capacity variables in URCS were determined over 20 years ago. Railroad operations have changed materially during that time, which may impact the cost relationships. Reviewing and updating the expense account groupings and their relationships could yield more accurate results by more directly allocating costs to particular movements.

Currently, URCS assumes that each expense category is a composite of several related accounts. Each expense group is then regressed on a single output and capacity variable. For example, the transportation fuels expenses category is regressed on miles of running track (capacity variable) and locomotive unit miles (output variable).

There is a possibility that splitting up certain cost categories might better represent the actual cost of providing service. For example, URCS currently assumes that one train mile is the same as any other. But if one sub-divided an expense category such as running crew wages into three separate categories representing train miles for unit train, manifest, and local delivery traffic, the results might be better tailored.

As discussed above, the variability factors for some expense categories were default factors adopted by the ICC because it lacked a better option at the time (see discussion at p. 5 above). Rather than continuing to use these default assumptions, the STB could consider estimating those categories that are not currently captured by URCS regression analysis.

An increase in the number of expense categories might provide greater specificity in developing cost equations. For example, the Board could consider adding an expense account that includes the costs of providing specialized services such as loading and unloading TOFC/COFC units, automobiles, coal, and ore, as well as TOFC/COFC pickup and delivery services. The revision/addition of accounts may also result in greater homogeneity[67] within the cost accounts regressed by the Board, yielding more comprehensive and reliable results.

ii.   *Capacity/Output Variables*

Because of both the changes in the railroad industry operations and the potential new expense accounts described above, it might also be necessary to re-examine which capacity and output variables have a causal relationship with a particular expense category. The STB could explore the possibility of using more than one output variable and/or whether or not there is a need for a capacity variable in a particular cost equation.

iii.   *Additional Variables*

The inclusion of additional variables in the URCS regressions might be necessary. For example, if the Board were to begin treating each Class I carrier as a separate entity as opposed to aggregating the past data for firms that later merged (see p. 22), that structural change could necessitate the inclusion of other variables.

iv.   *Alternative Functional Forms*

Some interested parties have argued that the linear regressions used in URCS are not consistent with actual railroad costs, i.e., railroad costs are non-linear. The STB could investigate alternative functional forms addressing a variety of issues including, but not limited to (1) comparing and contrasting alternative functional forms to those currently used in the URCS regressions; or (2) determining whether different functional forms could be used for different cost accounts.

v.   *Methodology – Identifying the "Best Model"*

The selection of the best model and most appropriate variables is not just a mechanical, statistical process. It is also necessary to draw on economic theory and established industry experience to guide the selection of variables to be included in the regression. R-1 data show that there is a high degree of correlation between the operations and expenses. Therefore almost any one of the operating statistics can be plugged into an equation, and the variable could turn out to be statistically significant – even though there might be a more appropriate variable from a theoretical, explanatory point of view. An overstatement or understatement of a particular railroad's costs could result due to a misallocation of costs. Accordingly, should new expense categories and variables for output, capacity, and shifts in operations be introduced into URCS, the STB would need to develop a systematic, rigorous set of criteria to evaluate the changes.[68]

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[67] A homogenous cost pool is a group of costs that are governed by the same set of determinants and that respond to changes in output in an identical manner.

[68] In order to assess the adequacy of any updated URCS regression equations, the STB would need to establish a hierarchical set of statistical tests. These criteria include, but are not limited to, the following: sign and significance, goodness of fit, and coefficient stability. Sign

(continued . . .)

b.   *Updating the Engineering Special Studies*

As discussed earlier, the engineering relationships in URCS are based on special engineering and time-and-motion studies, many of which were conducted or revised between the 1930s and 1960s. Given the significant increases in unit-train traffic as well as the rationalization and enhanced productivity of operations in recent decades, it is likely that the engineering relationships have changed over time. Pursuit of an exhaustive revision of URCS would encompass conducting sensitivity testing on all the special studies used in URCS to determine which studies have a significant impact on the resulting estimated costs. Only those relationships that materially impact costs and are shown not to reflect current railroad operations would need to be updated. Moreover, railroads may already capture some of the information reflected in the special studies such that the STB could simply consider modifying the R-1 reporting requirements. On the one hand, it is possible that not all of the approximately 15 special studies would need to be updated, but it is also possible that additional studies might be desirable.

New studies would better reflect railroad operations as they are carried out today. Efficiencies and innovation that have decreased the time or number of railroad personnel required to perform tasks could also be expected to lower the costs associated with particular rail operations.

2.   Costs and Analysis

a.   *Costs of the Comprehensive Option*

In addition to the costs of the Basic and Moderate options, pursuing the Comprehensive Option would require significantly increased use of external consultants. With regard to updating the regressions, the consultants would assist the Board with proposing new URCS regression models and testing their validity. Because this would be a substantial endeavor, the Board anticipates that the chosen consultants would work closely with Board staff over at least 2-3 years. Until the Board begins an exhaustive review of URCS, however, it is difficult to put a dollar figure on the resources that would be necessary to develop and implement any changes, with the most significant factors being how long it would take to complete the review, develop and test any new regressions, test alternative methodology changes proposed by commenters, and implement any necessary changes to the model. When the ICC adopted URCS in 1989, it had the benefit of both guidance from the RAPB over three years (with an annual budget of what would be $2,300,000 in 2010 dollars) as well as the services of Dr. Westbrook. Our rough

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and significance checks ensure that the output and capacity variables should have the correct sign (e.g., + or −) and are not due to random chance. Intuitively, it would not make sense for an increase in activity to decrease the amount of dollars spent. Statistical significance would verify that the effect of the variable in question is likely to result from actual railroad operations. Goodness of fit is a statistical term that explains how much variability of the expense grouping is accounted for by the output and capacity variables. Coefficient stability determines how coefficients and variability ratios change as new data are added or subtracted from the dataset. A robust regression should have both stable coefficients and stable variability ratios as observations are added to the dataset.

estimate for the cost of completing the regression component of the Comprehensive Option is $2,000,000, which includes obtaining the services of two econometric consultants for at least 2 years, a programming consultant for 1-2 years, as well as the hardware/software expenses described in the Moderate Option.

As the Board has not yet conducted the sensitivity testing to determine the number of studies that would need to be updated, it is also difficult to estimate the cost of updating the studies. The magnitude of updating special studies could require that they be completed by an outside firm, which would be supervised by industrial or cost engineers hired by the Board. To reduce costs, the Board would also consider the use of simulation models and Class I railroad reporting changes in lieu of actual time and motion special studies. Assuming that the Board would need to update only a small number of studies and that the Board could identify a cost-efficient method for doing so, the cost for special study component could be as low as $2,000,000. However, should the Board determine that a significant number of special studies must be performed, the costs of completing this component would grow significantly, to $10,000,000 or more.

Accordingly, the broad range of costs potentially necessary for the Comprehensive Option is $4,000,000 to $10,000,000 or more.[69]

> b. *Pros and Cons of the Comprehensive Option*

The Comprehensive Option would consider all of the concerns raised by interested parties in recent proceedings examining URCS. By applying modern econometric techniques to current and improved data, the STB may be able to significantly increase the accuracy of the URCS estimates and ensure they are consistent with modern railroad operations. Specifically, the examination of the expense accounts and their relationships to the capacity and output variables may help URCS more appropriately reflect the cost environment of today's carriers.

But the Board cannot predict whether the result of Comprehensive Option would be a relatively straightforward update of URCS or what would essentially be a completely new costing system. Major changes to URCS certainly could also affect the amount of traffic subject to the Board's jurisdiction under the statutory 180% R/VC test, potentially necessitating other regulatory or statutory adjustments.

The major drawback to the Comprehensive Option is the time and resources it would take to develop and implement. Review of the statistical relationships and special studies embedded in URCS is a major project that may take significant time, require assistance from multiple outside consultants, and involve a substantial funding commitment.

Indefinite deferral of examining URCS fundamentals and updating the special studies could eventually lead to a regulatory costing model that bears little resemblance to the "real world" rail industry. However, given the significant investment required to fully implement this

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[69] It is extremely difficult to provide more specificity than this broad range at this time, because there are many unknowns and assumptions that should become clearer as the Board progresses with its work on URCS. A $10,000,000 upper range estimate presumes no replication of a blue ribbon panel such as the RAPB, yet that might be helpful in future years. The cost of the RAPB was approximately $2.3 million per year, for three years (in current 2010 dollars).

project, before requesting funds for an exhaustive review of URCS, the Board would first like to explore whether an alternative costing model that may require less updating over time could be developed and could serve the agency's regulatory purposes. Should the alternative models prove unviable, the STB may need to request the additional funding necessary to complete an exhaustive review of URCS. We discuss two possible alternative models in Part IV of this report.

PART IV: OPTIONS FOR REPLACING URCS

In Part III, we described three options for updating the URCS model. Over the past year, as it has considered how URCS could be updated, the Board has also begun to explore the possibility of eventually replacing URCS with a new costing system. This section describes the alternative costing models studied to date.

There are a number of reasons why the Board believes it is important to explore alternatives to URCS within the framework of this URCS review. *First*, as discussed earlier, the Board's costing methodology was intended to be reassessed over time. The Board has a responsibility to ensure that it is fully informed on the most recent cost modeling theories and how they might be used to support the Board's statutory mandates.

Second, because URCS is based in part on observable railroad operations and engineering relationships, it will always need to be updated to ensure that those relationships continue to be relevant and appropriately incorporated into the model. An alternative model that is more reliant on data that is continually updated may not require the same large-scale revisiting that is necessary in URCS.

Third, there is a limited amount of railroad cost data used now to determine the variable cost of transporting goods by rail. The URCS model relies on aggregated annual cost information from just the large Class I railroads, even though the Board adjudicates cases involving Class I, regional, and short-line railroads. A costing model that relies on more disaggregated data that are either collected directly from the railroads and/or the Carload Waybill Sample might result in more tailored cost estimates.

This section describes two alternatives the Board is examining. The theories behind each alternative model hold promise but it is unclear at this time whether the models could be demonstrated to be viable from economic and practical perspectives, and if so, whether they would be an improvement over URCS.

Once the Board's internal review of the alternative costing models is complete, we intend to seek broad public input on the reasons for and against evaluation of these alternatives as a potential replacement for URCS. We recognize that replacing URCS with a new model would delve into the unknown and may result in criticism from stakeholders on that basis alone. We believe that, however, early critiques of alternative models could aid the Board in any potential development of such a model. Pursuing either of these alternative costing models would require additional funding for the Board to hire an outside consultant(s) to fully develop, program, test and document such a model.

A.   New Empirical Industrial Organization

The New Empirical Industrial Organization approach, or NEIO, infers an estimate of incremental costs for a particular movement by examining the pricing for those kinds of movements. In short, NEIO would use the *pricing* data collected by the Board from all rail carriers to estimate *costs* by separating out the portion of the price that is attributable to the carrier's market power.

To explain NEIO, we start with the basic economic concept that in a market where there is perfect competition, prices will reflect what are referred to as "marginal" costs. Marginal costs are those costs that are required to produce one additional unit of the item being sold.[70]

In a perfectly competitive market, marginal costs will be equal to the price of a good. However, many markets are not perfectly competitive and, as such, prices reflect not only marginal costs but also a "markup." This markup, according to the economic theory, reflects the degree to which the seller has pricing power over its buyer and is able to raise prices beyond marginal costs to increase its profit. A large number of academic papers examine prices in non-competitive markets, including a 1989 Stanford University study by noted economist Timothy Bresnahan that referred to "New Empirical Industrial Organization" models.[71]

NEIO's basic premise is that price is equal to marginal cost plus a market power markup. The NEIO approach recognizes that prices and outputs differ across markets not only because of differences in demand and cost, but also because of differences in competitive conditions (i.e., behavior, conduct, and rivalry). Assuming similar demand and costs, prices generally will be lower in highly competitive markets than in monopolistic markets. But since there are varying degrees of competitive rivalry ranging from perfect competition to complete monopoly, the NEIO model theoretically allows for departures of prices from these marginal costs. The basic idea is that marginal costs can be estimated through prices and an estimation of market power.

In the railroad industry, the "product" that would be analyzed under a NEIO approach is the movement of a good by rail from one location to another. The "price" would be the shipment specific revenue data provided in the Carload Waybill. The "marginal cost" would be the additional cost it would take to carry one additional carload/train of goods between two points.

Rail transportation demand and pricing would play a key role in NEIO. The demand function depends, theoretically, on the prices of the good transported, the prices of that good's substitutes and complements, the prices of rail transport and its substitutes, and service characteristics such as speed and reliability of service. Pricing is based on the basic economic principle that a firm will price at the level where the incremental revenue from the last unit sold equals the incremental cost of that last unit.

A key to NEIO in the railroad context would be the index of competitiveness that estimates the departure of price from marginal cost. This departure depends critically on the level of market rivalry, i.e., whether the market structure is monopolistic, oligopolistic or competitive. This departure could also depend on the strength of competitive factors that constrain rail pricing. For the purpose of modeling railroad costs under NEIO, it would be very important to measure as accurately as possible the departures of prices from marginal costs as captured in econometric estimation of the market power markup. This is because competitive constraints vary across markets, with some markets served by multiple railroads, or by a single

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[70] These costs are also referred to as incremental costs.

[71] Timothy Bresnahan, Empirical Studies of Industries with Market Power, in Richard Schmalensee and Robert D. Willig (eds), HANDBOOK OF INDUSTRIAL ORGANIZATION at 1011-1057 (Amsterdam: North-Holland, 1989).

railroad that faces other constraints on pricing such as other nearby railroads, trucks, barges, truck-barge combinations, or other product and geographic sourcing options.

From the Board's perspective, the potential advantages of the NEIO approach are clear. The Board already collects a massive dataset of pricing information from the railroads annually via the Carload Waybill Sample. The Carload Waybill Sample is a collection of data from hundreds of thousands of individual rail shipments each year (representing 2-3% of overall rail traffic) that reveal a variety of features of the shipment, including the tonnage, commodity, origin and destination, and price charged by the railroad. This wealth of information could be further tailored to provide even more granular information about representative sample rail shipments. With a dataset of this size, the agency may be able to create a costing model that can be highly tailored to the particulars of a shipment. While the Board can and does make modifications to URCS to tailor it to shipment types, it would not be feasible for the agency to collect shipment specific costing data in the R-1 reports on the same scale as it does for Carload Waybill Sample revenue information.

Also, the NEIO approach might be able to provide a viable means of costing movements on short-line and regional railroads, rather than relying on models developed for the Class I carriers, and may even be able to provide different cost estimates based on the geographic origin and destination of the movement. And once created, a NEIO model might largely automatically adjust to changes in the industry as reflected in the R-1 revenue data (with periodic changes to the different algorithms for calculating market power), making the expense of maintaining the model less costly.

But there are also potential disadvantages to NEIO that would need to be explored further. Most significantly, the approach requires econometric models to estimate the relationship between price, cost, and market power. A key question is whether modelers can develop a suitable and appropriate parameter for market power. Without that parameter, the model would be unable to distinguish whether differences in transportation rates are due to differences in incremental costs or differences in market power, rendering the model unusable as an URCS replacement. As we begin our exploration of the NEIO model, we stress that the parameter for market power in NEIO will never be a perfect proxy for actual market power. For regulatory purposes, the parameter simply needs to be sufficient for the econometric model to use the power of hundreds of thousands of annual observations to draw out a reasonable estimate of marginal costs.

The NEIO approach has also been the subject of some criticisms in the economics literature. For example, economist Kenneth Corts argues that because the departure of price from marginal costs in an oligopolistic market typically involves the reactions of rivals, the NEIO model is logically flawed by its attempt to capture inherently dynamic responses in a static model.[72] The Board will consider this and other criticisms in its continuing study of alternative models.

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[72] Kenneth Corts, Conduct Parameters and the Measurement of Market Power, 88 Journal of Econometrics No. 2 at 227-50 (Feb. 1999).

B.   The Christensen Cost Model

Another alternative under consideration by the agency is the sort of hybrid cost function/pricing model described in the Christensen Report on the state of competition in the railroad industry.[73]

Christensen developed a hybrid model that incorporates marginal cost estimates from a variable cost function with estimates from a pricing model. The variable cost function portion of Christensen's model assumes that variable inputs (e.g., labor, railroad maintenance of way) are employed at cost-minimizing levels. Rights-of-ways and structure capital are assumed to be partially fixed inputs since they may not always be at cost-minimizing levels in the short-run but can be adjusted in the long run. Christensen developed a method that generates marginal costs from the estimated parameters of their variable cost function. Christensen uses these marginal costs to examine how rail revenue per ton-mile, on average, is marked up over the competitive benchmark of marginal cost and changes over time.

Christensen developed a pricing model to characterize the extent to which cost and market structure features of shipments account for variations in unit revenues at the commodity level. This pricing model could be considered a 'NEIO' type model because it is a profit-maximization model of railroad behavior, subject to constraints from alternative shipping modes that relate reported revenue per ton-mile to cost and market-structure features of sampled shipments.

The Christensen Report explains that the pricing model is limited because it is unable to separate out marginal costs from market power markups. In other words, the model allows for the estimation of factors that cause variations in costs and markups for railroad movements, but not for the levels of costs and markups themselves. Christensen attempts to overcome this limitation by incorporating generic marginal cost information from its variable cost model into estimates from its pricing model. This step allows Christensen to examine the adjusted costs and revenue per ton mile for "typical" shipments in order to analyze costs and markups at the commodity level. Additional work would need to be done to determine whether the model could be used to estimate shipment-specific costs.

As Christensen's model makes use of both aggregated R-1 railroad accounting data as well as Carload Waybill Sample data to generate estimates, we describe it as a hybrid cost function/pricing model. The use of both actual cost data and actual pricing data has appeal because it could be used to create a more robust and complete picture of shipment specific costs than either approach alone. As Christensen explains in its report, however, the hybrid model it developed was not designed to apportion costs for shipment-specific movements. Rather, it was strictly intended to examine and model the trend of railroad rates as they relate to costs across various commodities in order to examine the effects of competition. Accordingly, substantial

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[73] See supra note 46.

additional research would be needed to determine whether this type of model could be modified to estimate shipment specific costs.[74]

C.   STB Assessment of Alternatives to URCS

Both NEIO and the Christensen hybrid approaches warrant further consideration. The NEIO model is both intellectually and theoretically appealing because it uses current pricing data from the Carload Waybill Sample, but there is uncertainty over whether a pricing model can be used to estimate movement specific costs by identifying a market power markup. The hybrid approach, which combines cost data from the R-1 reports and the shipment data from the Carload Waybill Sample, has the advantages of completeness and potential ability to attribute portions of overall cost to very specific types of services. Its disadvantage is the complexity of linking the aggregate cost data to the Carload Waybill data.

There are also two overarching concerns about whether either approach can replace URCS entirely. *First*, both approaches estimate a short run marginal cost, rather than the longer run variable cost used in URCS and specified by Congress in 49 U.S.C. § 10707 to create the 180% R/VC jurisdictional threshold on railroad rate challenges. Although many might view that as a positive feature of the models, it is unclear how the Board would reconcile a move towards either alternative with the statutory 180% R/VC threshold. If the Board were to adopt one of these alternatives, it might have to consider adopting a bridging mechanism to convert marginal costs to variable costs. Another alternative would be for Congress to address the 180% R/VC ratio requirement legislatively.

Second, the agency may need to retain URCS for certain limited purposes in any event. One of our simplified procedures for challenging rail rates depends critically on an estimate of *total* operating expenses (both fixed and variable). The Simplified SAC methodology for medium-sized rate disputes uses URCS to develop that estimate of the total operating expense associated with particular segments of the existing carrier's rail operations. As of the submission of this report, the Board has not identified any obvious way to use either a NEIO or hybrid model for that purpose.

The Board anticipates completing its preliminary study of NEIO and the hybrid approach in the near term and then, if appropriate, seeking comment from the public regarding the advantages and disadvantages of fully developing either of the models as a potential replacement for URCS. Should the Board ultimately determine that it should pursue either model, it would need to hire two types of consultants: econometrician(s) and computer programmer(s). These consultants would assist the Board over several years in developing, testing, programming, documenting and implementing the alternative model. We estimate that it would cost approximately $2 million to do so.

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[74] The Christensen Report suggests that additional cost data would need to be collected in order to allow shipment-specific estimation. See Christensen Report, Vol. 2, at 11-7.

CONCLUSION

The maintenance of an accurate costing tool that is as reflective of the modern rail industry as practicable is one important step in ensuring that the Board fulfills its statutory duties. The Board's recommendation is that it pursue the Moderate Option, which considers cost-effective potential modifications to URCS that could increase its functionality and accuracy, while also pursuing the development of alternative models that might better serve the Board's regulatory purposes. We believe this dual-track approach will produce the best results for the agency, stakeholders and American taxpayers. The Board would need a total of $625,000 in additional funding to pursue the Moderate Option (as discussed at pp. 22-24 above).

Appendix: Glossary

Avoidable Cost: The expenses that the rail carrier would not incur if it stopped providing transportation over a line.

Book Value Methodology: A methodology that determines the value of an asset based on the original price paid for the asset less depreciation.

Carload Waybill Sample: A random sample of railroad waybills (i.e., freight bills) for all U.S. rail traffic submitted by those rail carriers terminating 4,500 or more revenue carloads in any of the 3 preceding years, or at least 5% of the revenue carloads terminating in any state in any of the 3 preceding years. This sample represents 2-3% of all railroad traffic.

Circuity Factor: The extra distance a railroad car travels in excess of the shortest possible route between two points. It is only used in URCS Phase III costing if the actual miles are not known.

Coefficient Stability: In regression analysis, a test that determines how coefficients and variability ratios change as new data are added or subtracted from the underlying dataset.

Cross Sectional Dataset: A dataset for multiple entities over a single period of time (e.g., data for all U.S./Class I railroads for one year.) See also Time-Series Dataset.

Dependent Variable: In regression analysis, the variable that will be determined based upon the independent variables. For example, the 15 railroad expense account groupings defined in URCS Worktable C are dependent variables,

Engineering Studies: The engineering relationships in URCS are based on special engineering and time-and-motion studies, some of which were conducted or revised between the 1930s and 1960s. These studies measure the time and effort involved in performing various railroad activities. They serve as the basis of the URCS "special study" factors.

Fixed Costs: Costs that do not vary with changes in the level of railroad traffic.

Goodness of Fit: In regression analysis, a test that explains how much of the variability of the dependent variable (e.g., expense account groupings) is accounted for by the independent variables (e.g., output and capacity variables).

Homogeneity/Homogeneous Cost Pool: A homogenous cost pool is a group of costs that are governed by the same set of determinants and that respond to changes in output in an identical manner.

Independent Variable: In regression analysis, the variable (or variables) that are used to predict the value of the dependent variable. For example, these are the output and capacity variables used to define the expense account groupings in the URCS Regressions.

Interstate Commerce Commission (ICC): The predecessor agency to the Surface Transportation Board.

Linear Regression: A specific type of regression analysis, where the change in the dependent variable is constant, given a change in the independent variables. In other words, a linear model estimates a constant effect of one or more independent variables on one dependent variable.

Marginal Cost: The cost required to produce one additional unit.

Panel Dataset: A dataset of multiple entities (cross-sectional) over multiple periods of time (time-series). URCS originally used a panel dataset to estimate the "URCS Regressions" for 14 Class I railroads over 9 years of data.

Parameter Estimate: In regression analysis, the estimated effect of an independent variable on the dependent variable.

R-1 Reports: Annual reports that Class I railroads are required to submit to the STB that summarize the operating expenses and statistics for a particular year.

Rail Form A: An accounting system devised by the Commission in 1939 that uses statistical techniques to develop variable unit costs from annual expense and operating information.

RAPB: Railroad Accounting Principles Board. The RAPB was created by Congress in the Staggers Rail Act of 1980 to evaluate and recommend an accurate costing methodology to the ICC. The RAPB existed from 1980-87.

Regional Railroad: Generally, Class II railroads. The STB defines Class II railroads as railroads with less than $250 million but more than $20 million in revenues, adjusted for inflation from base year 1991. See also Short-Line Railroad.

Regression Analysis: A statistical estimation process used to find relationships between a dependent variable and one or more independent variables.

Replacement Cost Methodology: A methodology that determines the value of an asset by determining the current cost to replace it with a similar asset.

Revenue/Variable Cost (R/VC) Ratio: The revenue earned on a specific rail movement divided by the variable cost of providing the service, expressed as a ratio.

RoadRailer Operations: The movement of highway trailers with retractable or detachable rail wheels directly over the tracks of the rail system.

Root-Mean-Square Error Forecast (RMSEF): A metric that expresses how well a regression fits the data (with a lower error of forecast meaning a better fit). Technically, this is the square root of the sum of the square of differences between the actual observations and those predicted by the regression, divided by the number of observations.

Short-Line Railroad: Generally, Class III railroads. The STB defines Class III railroads as railroads with $20 million or less in revenues, adjusted for inflation from base year 1991. See also Regional Railroad.

Statistical Outlier: An observation (or a set of observations) that appears to be inconsistent with the remainder of the dataset. Tests to determine whether or not outliers matter ask the question whether the inclusion of additional observations would yield significantly different results in a regression analysis.

Statistical Significance: In regression analysis, the likelihood that a result of the dependent variable is caused by the independent variables, and not by "random" chance.

Switching: The process of placing cars in a specific order (as in a classification yard), placing cars for loading or retrieving empty cars (industrial switching), or the process of adding or

removing cars from a train at an intermediate point. It can also be the movement of cars from one point to another within the limits of an individual plant, industrial area, or a rail yard.

System-Average Unit Costs: See Unit Costs.

Through Train: A train operated between two or more major yards or distribution points on a particular railroad.

Time-Series Dataset: A dataset for a single entity over multiple periods of time. For example, data for a single railroad over a number of years. See also Cross-Sectional Dataset.

TOFC/COFC: Trailer on Flat Car/Container on Flat Car: Any truck trailer or container moving on a railroad flat car in intermodal service.

Toxic Inhalation Hazards (TIH): This classification, which includes chlorine and anhydrous ammonia, is defined in accordance with 49 C.F.R. §§ 171.8, 173.115, and 173.132 to include materials that, when inhaled, are known or presumed on the basis of testing to be so toxic to humans as to pose a hazard to health in the event of a release during transportation. These materials include, but are not limited to, hazardous materials listed at 49 C.F.R. § 172.101 as either Division 2.3 materials, or Division 6.1 materials that can be characterized as an inhalant under § 173.132.

Uniform System of Accounts (USOA): Accounting instructions that specify the accounting codes and categories that railroads are required to use in their R-1 reports for regulatory purposes and explain the accounting requirements for certain types of transactions.

Unit Costs (System-Average Unit Costs): A railroad's costs of performing the intermediate activities required to provide transportation service, developed by dividing the expenses associated with a given activity by its associated service units. Examples of unit costs are: Gross Ton-Mile Operating Cost and Locomotive Unit Mile Operating Cost.

Unit Train: A train operating generally intact between point of origin and final destination, normally hauling a single bulk commodity in similar cars.

Variability Factors/Variability Ratios: A proportion of an activity's total expenditures that are attributable to expenditures on variable inputs. These factors are used to determine the proportion of 15 expense account groupings in URCS that are variable.

Variable Costs: Costs that vary with traffic levels.

Way-Train: Trains operated primarily to deliver or pickup cars between local way stations and classification yards.