RAIL COST DATA AND THEIR USE IN TRANSPORTATION AND MARKETING ANALYSIS

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FOREWORD

The use of rail cost data in transportation analysis has increased markedly in recent years. No longer are cost data confined solely to regulatory matters. Rail cost data, rather, are currently being used in a variety of settings, ranging from grain transportation rationalization studies to state-wide rail planning.

This paper presents an overview of the use and development of rail cost statistics in transportation and marketing analysis. Cost finding formulas developed by the Interstate Commerce Commission are discussed both in terms of their current usage and potential application, and situations where cost data are relevant to public policy or private-sector decision-making are highlighted. The purpose of the paper is to provide transportation and marketing analysts with a general description of costing procedures and areas of application and use.

I. INTRODUCTION

A variety of economic and political forces have combined during the last decade to produce a wide-spread need for rail cost information. The regulation of rail rates, once based largely on rate comparisons and questions of reasonableness and discrimination, has swung more closely to a cost-of-service standard. Proposed strategies for regulating market dominant traffic, particularly coal, all rely heavily on variable cost estimation. The so-called "Ramsey Pricing" policy considered by the ICC, for example, is really a procedure for allocating constant costs on the basis of commodity demand elasticities.

It is outside of the regulatory arena, however, where the real proliferation in rail cost analysis has occurred. Physical distribution and logistic activities, once concerned only with published scales of rates, have become increasingly sensitive to the carrier's cost-of-service and how this information might be used in the area of rate negotiations. Branchline abandonment and rail systems rationalization, particularly in grain producing regions, have served to make public and private agencies more aware of the need to understand a carrier's cost structure. The introduction of multiple carload, trainload, and multiple origin rate structures, in addition, has caused both shippers and producers alike to become more concerned with the level efficiencies and the cost differences between service levels. All of these, in turn, have affected the interest of the transportation and marketing analyst, and have led to the introduction of rail cost data into a variety of settings.

II. POTENTIAL USES OF RAIL COST DATA

Perspectives on Rail Cost

The need for an interpretation of rail cost data differs between transportation users, governments, and providers of transportation services. Transportation carriers are concerned primarily with the efficiencies gained (or lost) through the introduction of new or different levels of service or through the abandonment of relatively high-cost services (i.e., light-density lines). Governments and public agencies of various kinds are concerned with the long-term provision of services within their region. The need, here, is for a better understanding of the efficiencies involved with maintaining and operating various portion's of a carrier's system, as well as the ability to predict the type and level of service which will be available in the future.

Transportation users, like carriers and public agencies, are also concerned with the level of service which will be available and the price which will be charged. Transportation users, however, must adjust directly to changes in rail service or price. Since the F.O.B. price of their commodity includes a portion of transportation charges, shippers are necessarily sensitive to the rate charged and the relationship between carrier price and cost.

This combination of perspectives on transportation issues has led to the varied and widespread use of cost data in a multitude of settings. Some of the more salient of these are discussed below.

Monitoring of Long-Term Rail Prices and Related Policy Questions

Estimations of long-run marginal cost (LRMC) by rail are relevant to transportation analysis for several reasons.

One school of thought indicates that in a competition environment, rail rates will tend towards LRMC, driven there by competitive pressure. This does not mean that rates will mirror exactly the LRMC of service. Long-run rail rates under deregulation, however, should bear some relationship to LRMC in a competitive market situation.

The competitive market situation, however, will not obtain universally and will differ from market-to-market, depending on the modes of transportation available and the marketing considerations of the commodity. In certain instances, therefore, rail rates may tend to diverge more widely from LRMC than in others. Here, the monitoring of long-run rates in relation to LRMC may be a necessary activity by transportation analyst and government agencies.

In either instance, however, whether competitive forces drive rail rates toward LRMC, or whether widespread divergence from LRMC persists or develops, the monitoring function is an important one. In competitive markets, rough proxies of rates, by mode, may be developed from LRMC. In non-competitive markets, the effects of geographic or market competition in holding rates in line with cost may be ascertained.

As a result, a host of policy implications will normally flow from the analysis of LRMC, such as: (1) the effectiveness of market or geographic competition in placing an upper ceiling on commodity rates, (2) the effectiveness of various forms of intermodal and/or intramodal competition in holding rates close to LRMC, and (3) the level of efficiency involved with various configurations of railroad systems.[1]

Analyzing The Efficiency and Feasibility of Various Service Alternatives

No longer are railroad service and pricing based on solely a single car standard. In the grain industry, particularly, the introduction of multiple-service rate structures, which include a package of price and service options, has led to evolutions in the grain handling and marketing systems. The competitive cost-of-service between various service levels has therefore become a principal consideration in grain transportation studies.

Line-Segment Viability

Sine the bankruptcy of the Penn Central in the early 1970's a great deal of attention has been focused on the cost of operating various segments in a system. This is one of the primary concerns of government in the area of rail transportation, that is forecasting the viability of certain portions of a carrier's system and planning for these changes.

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[1]For example, have recent mergers served to lower per unit operating costs, or what is the effect of reduced branchline trackage on rail cost.

Evaluating Surcharges

With the passage of the Staggers Rail Act, railroads may now level surcharges on branchlines to bring revenues in line with cost. Because of the potentially devastating impacts which such surcharges could have on individual branchlines or shippers, State governments and the shipping public must necessarily be concerned with the cost-of-service over these line-segments.

Summary of Uses

Current and potential uses of rail cost data in transportation and marketing analysis range from comparative cost studies of service levels to the monitoring of long-run rail rates. Procedures and sources for developing these cost estimates are discussed next.

III. COST FINDING Formula

The Interstate Commerce Commission has historically been concerned with rail cost estimation. The ICC originally developed Rail Form A (RFA), a statistical-accounting methodology which would produce either territorial or individual carrier costs. The Commission is currently working on a predecessor to RFA, the Uniform Rail Costing System (URCS), which incorporates certain improvements over RFA. URCS, however, is not technically-workable at this time and must yet undergo a rule making proceeding.

Levels of Costing

Potential levels of cost data range all the way from individual carrier RFA costs, which must be developed by individual users, to regional cost scales which are published by the I.C.C. Costs may also be developed for single carload, multiple carload, and train-load shipments. Costs, in addition, may be developed for individual line-segments.

Single-car RFA costs may be developed at the territorial level using published I.C.C. cost scales. Two versions of RFA cost scales are currently available: a 1977 version which must be updated using railroad inflationary indices and a 1980 version which can be updated using Railroad Cost Recovery Percentages calculated annually.

The following example illustrates the development of single car Rail Form A costs for a typical grain movement using 1980 regional costs for Mountain Pacific and Trans-Territory Region (Region VI).

Single Car Costs: An Example Using *Rail Form A*

In developing movement costs, two items are needed: (1) the RFA unit costs which describe the change in expense per unit of output, and (2) the service units or units of output consumed by the movement.

Cost Elements

The range of service units associated with railway transportation can be condensed to four summary measures of output: (1) the carload, (2) tons originated and terminated, (3) ton-miles, and (4) car miles. Each represents a specific function in the provision of railroad services.

Assuming a single-carload movement, only two characteristics of the movement need be known: (1) the number of tons in the consignment, and (2) the length of the haul. For a haul of 800 miles, for example, Table 1 depicts the development and calculation of the service units necessary to estimate movement costs, and shows how these service units might be combined with RFA unit costs to produce movement cost estimates.

TABLE 1. EXAMPLE OF SINGLE-CAR COST CALCULATION USING 1980 RAIL FORM A, ASSUMING AVERAGE COVERED HOPPER CAR CHARACTERISTICS			
ITEM		SOURCE	AMOUNT
1.	Tons consigned	User supplied	98
2.	Short line miles	Distance tariff	800
3.	Circuity factor	Statement 1C1-77	1.18
4.	Ton miles	L1 * L2 * L3	92,512
5.	Car miles	L2 * L3	944
6.	Cost per ton mile	RFA, B(3417)	0.6057748
7.	Cost per car mile	RFA, B(3473)	66.5693436
8.	Cost per carload	RFA, B(3711)	20669.69
9.	Cost per ton	RFA, B(3728)	3.21326509
10.	Ton mile costs	L4 * L6	56041.44
11.	Car mile costs	L5 * L7	62841.459
12.	Carload costs	L8 * 2	41339.38
13.	Terminal ton costs	L1 * L9 * 2	314.90
14.	Total variable cost	L10 + L11 + L12 + L13	160537.17
15.	Cost per ton	L14 ÷ L1	1638.14
16.	Cost per cwt.	L15 ÷ 20	81.9
17.	Loss and damage	Statement 1C1-77	18.0
18.	Movement cost	L16 + L17	99.9

Enhancements

The costs presented in Table 1 are at the highest possible level of aggregation. They assume an average train type, as well as average movement characteristics. Where the characteristics of a movement are known to be different from the system-average, RFA costs may be adjusted to reflect these differences.

Multiple Car Costs

Multiple car costs may also be developed using Rail Form A costs. Adjustments may be made to: (1) switching times, (2) car days at origin and destination, (3) station and billing costs, (4) train time, and (5) train weight and locomotive units, among others. These adjustments, however, are quite detailed and require a working understanding of RFA or URCS, as well as a detailed knowledge of the commodity being transported and the operating characteristics surrounding the movement.

IV. APPLICATION TO LINE-SEGMENT COSTS

RFA or URCS costs have other areas of application as well, most notably in the analysis of line-segment viability. Here, the problem is to estimate on-branch and off-branch costs for individual branchline segments.

Off-Branch Costs

Off-branch costs are calculated for branchline abandonment proceedings or for purposes of line rehabilitation using adjusted Rail Form A or URCS costs. The off-branch costs constitute the same four cost elements as depicted in Table 1. The difference here is that instead of just costing a single movement, all of the traffic moving onto or off-of a line-segment is costed. Once calculated, off-branch costs are added to the sum of on-branch costs to produce total line-segment cost totals.

On-Branch Costs

On-branch cost elements for abandonment proceedings, or for line viability analysis, are synthesized from a combination of direct accounting data and allocation procedures for distributing common costs to the branchline. Certain of the same types of cost allocation procedures used in Rail Form A and URCS are used here as well. However, the date are usually much more specific.

Branchline accounting systems are established only when a line-segment is slated for abandonment. Until the system is established, on-branch costs must by synthesized from Rail Form A and economic-engineering estimates. North Dakota State University has constructed a model for analyzing the viability of individual branchlines without relying on the use of railroad accounting data. This methodology develops estimates of crew time on the branchline and measures of locomotive, train mile, and car mile service units consumed.

V. SUMMARY

This paper has attempted to present a brief overview of rail costs and their use in transportation and marketing analysis. Because of the technical nature of the cost finding formula, a detailed description of the statistical and cost accounting procedures which underlie the unit costs is not possible with the scope of this document. For more detailed descriptions of rail costing procedures, readers should refer to **Rail Carload Cost Scales,** Statement No. 1C1-77, Bureau of Accounts, or **Explanation of Rail Cost Finding Procedures** and **Principals Relating to the Use of Costs**, Statement No. 7-63, Cost finding Section, November 1963.

The paper has also attempted to overview the area of potential application where rail cost data may be used. By way of summary, these relate to: (1) monitoring of long-run rail rates, (2) comparative costs analyses of various service levels, and (3) line-segment costing and evaluating surcharges.

In addition to these, cost data are still relevant to many areas of regulatory policy.