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THE IMPACT ON CANADIAN RAILWAYS AND SHIPPERS OF COST-BASED PRICING FOR RAILWAY FREIGHT

by

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1.0 Introduction

The enactment of the National Transportation Act and the consequential amendments to the Railway Act in 1967 produced a regulatory regime that has encouraged Canadian railways to differentiate the prices for their various commercial freight services on the basis of shipper demand for those services. This method of setting railway prices is economically efficient since it permits a railway to charge rates that both reflect the value of rail service and provide the opportunity for the railway to generate sufficient contribution from all movements to cover its total costs, including its cost of capital.

In the course of public debate in respect of the federal government's proposals for regulatory reform in the transportation sector set out in the position paper Freedom to Move(1) released in July, 1985, the Province of Alberta has proposed that railway rates be capped by a specified ratio of revenue-to-variable cost unless a railway could demonstrate "effective" competition for the traffic.(2) In other words, a rate above that ratio would be deemed "unreasonable" unless the railway could demonstrate otherwise.

This paper (a) restates the argument why demand-based differential pricing is economically efficient compared to a cost-based pricing system that pro-rates the constant or fixed costs of the railway among the various traffics and (b) addresses the proposal for maximum rate control advanced by the Province of Alberta.

2.0 Railway Commercial Viability

Any discussion of railway pricing practices must have as its starting point the recognition that the railways

are entitled to the opportunity to earn a level of revenues that will enable them to recover their total costs, including their cost of capital. A railway, like any other commercial undertaking, must compete for the resources that it employs in the provision of its services. If the providers of these resources do not expect to earn a return from their deployment in the railway enterprise equivalent to what the resources could earn in the next best alternative use, the resources will be withdrawn and employed elsewhere. As a simple example, a railway would not be able to attract employees if it were to offer hourly wage rates of $2.00 per hour while alternative occupations that required similar skills offered $10.00 per hour.

The economic principle described above is as relevant to capital as it is to any other resource. Unless a railway is afforded the opportunity to earn a return equal to its cost of capital - that is a return sufficient to attract and retain the funds necessary for the acquisition of the required plant and equipment - that capital will be denied to the railway and put to alternative uses where the returns are higher. For example, one would not expect a provider of capital to invest funds in a railway if the expected return were five percent per year while those same funds could be expected to earn 10 percent per year if placed in an alternative investment of comparable risk.

The perception by investors that a railway will be unable to earn its opportunity cost of capital will result in the inability of that railway to renew its assets at the end of their economic lives or to acquire assets for the purpose of modernization and the accommodation of anticipated increases in traffic. Over time, the railway will no longer be able to provide the required level of service and remain competitive due to the deterioration in plant and equipment. The ultimate result is the termination of service.

The chain of events described above has been experienced in both Canada and the United States. Prior to the enactment of the Western Grain Transportation Act in 1983, Canadian railways were required by law to transport grain to export positions at rates that were three cents per hundredweight less than those published by the Canadian Pacific Railway Company on September 6, 1897.(3) At the end of the 1970s, the costs to the railways of moving grain far exceeded the revenues from the traffic. Notwithstanding indirect federal government subvention in the form of car acquisitions, compensation for the operation of uneconomic branch lines and branch line rehabilitation programs, the losses incurred by the

railways on export grain were undermining the viability and effectiveness of the grain handling system at the cost of lost export sales.(4) In addition, the general shortage of funds as a result of the losses on grain was severely curtailing the ability of the railways to finance capacity expansions to accommodate anticipated increases in the volume of grain and other bulk commodities.

Similarly, the succession of railroad bankruptcies in the United States during the 1970s and the generally poor financial condition of the remaining carriers underscored the shortcomings of a regulatory policy that subordinated the commercial viability of carriers in favour of other considerations. In recognition of past failings in regulatory policy towards the railroads, the Staggers Rail Act of 1980 is explicit in its acknowledgement that the "revenue adequacy" of rail carriers is in the public interest and conducive to the promotion of a "safe and efficient rail transportation system".(5)

Freedom To Move proposes that the statement of national transportation policy objectives set out in section 3 of the National Transportation Act be revised to recognize that "transportation is a service industry designed to assist Canadian shippers in meeting the competitive demands of the future".(6)

While there is no denying that the railways fulfil a service function, it is equally true that if the railways are not granted the potential to be commercially viable (that is, the potential to earn a return equal to their cost of capital), then ultimately they will be unable to provide any service at all. The contemplated policy objective described in Freedom to Move cannot be achieved without the concomitant recognition that the prices charged by the railways for a given level and quality of service must provide for the commercial viability of the supplier of that service.

3.0 Demand-Based Differential Pricing

For a railway to be commercially viable, it is essential that it practice demand-based differential pricing whereby the prices for railway service and, more specifically, the recovery of the constant or fixed costs of the railway above the long-run variable cost of providing the service, vary among movements in response to differences in modal and market competition.

The economic rationale for demand-based differential pricing flows from three characteristics of the railway industry in Canada that together produce an economic environment unlike that of most other industries. These characteristics are:

(1) a railway produces a wide variety of different transportation services (for example, unit and solid trains of bulk commodities, single and multiple car shipments of merchandise traffic, hazardous materials transportation, and trailer-on-flatcar and container-on-flatcar services);

(2) the various transportation services are sold in marketplaces that have different demand characteristics; and

(3) a significant portion of total railway expenses are fixed or constant in that they do not materially increase or decrease with reasonable changes in the total volume of services provided, and are common to the production of the various transportation services.

These characteristics of the railway industry create an environment wherein a railway cannot set a cost-based price for each transportation service at a level that makes an equal relative or absolute recovery of fixed or constant costs and, simultaneously, sustain commercial viability. This is because such prices will be too high to attract substantial amounts of traffic that would otherwise be carried by the rail mode if the rates were reduced for that traffic. The loss of these movements will reduce the volume of traffic over which the constant costs must be apportioned to the point where the remaining traffic is also priced out of rail service, and the railway terminates service.

In contrast to a cost-based pricing method that allocates constant costs equally among all transportation services, demand-based differential pricing apportions these costs on the basis of the differences in the value of the transportation services to the shippers who use them. Value of service pricing is conceptually no different from the pricing of all resources consumed throughout the economy generally since it approximates the maximum price that a shipper is prepared to pay for the service rather than do without it. In the case of the railways where there are barriers to freedom of entry or exit into the industry, there does not appear to be justification for constraints on value of service pricing unless total railway revenues exceed total railway costs (including cost of capital) or where the revenues from a specific railway service exceed the stand-alone cost of providing that same service.

Differential pricing permits the railway to establish prices that optimize the volume of traffic over which constant costs are apportioned. Further, it yields a set of prices by which all shippers benefit from the economies of scope, scale and density inherent in multi-product railway service.

If one accepts that the value of railway transportation services differs significantly among potential purchasers of those services, the following simple example demonstrates that demand-based differential pricing, with its unequal recovery of constant costs, is an economically efficient method of establishing railway prices, and over the long term, yields the lowest transportation rate to shippers.

Assume that a railway has two types of potential traffic, A and B, and that, if both types of traffic moved by rail, each would incur a variable cost of $400, and that the railway would experience constant or unattributable costs of $250. Further assume that the value of the transportation service is $625 to Traffic A and $425 to Traffic B. Thus the railway could earn total revenues of $1,050 from the carriage of these traffics - an amount that is equal to its total costs.

If the railway's prices were cost-based, with an equal recovery of constant costs, then the rates would be set so as to produce $525 of revenues from each traffic. At this level, each traffic would yield $125 towards constant costs.

However, because the value of the transportation service to Traffic B is only $425, the traffic could not move at the cost-based rate and would be lost to the railway. Thus without Traffic B, Traffic A would have to pay rates that yield annual revenues of $650 ($400 of variable cost plus $250 of constant costs) if the railway is to sustain commercial viability. However, the value of the transportation service to Traffic A is only $625 and, therefore, the railway could carry this traffic only until such time as it eventually goes out of business since it would not be recovering the total cost of providing the service. In addition, the shippers of both Traffics A and B will pay higher transportation prices because of the enforced use of alternative modes in the absence of rail service.

In contrast, demand-based differential pricing will meet the rail transportation requirements of both traffics and, at the same time, permit the railway to achieve an adequate return on its capital. That is, if Traffics A and B each yield revenues to the railway that equal the respective values of rail service ($625 for Traffic A for a revenue-to-variable cost ratio of 1.56 and $425 for Traffic B for a revenue-to-variable cost ratio of 1.06), they will each be able to secure the most economical transportation prices, and provide sufficient revenues for the commercial viability of the railway.

The above example also demonstrates why the imposition of a rate ceiling incorporating a specified revenue-to-variable cost ratio that produces a level of revenues below the value of service to the shipper will, in the long run, deny the benefits of railway service both to that shipper and to those other shippers whose traffic is moving at rates below the revenue-to-variable cost ceiling. If the revenue-to-variable cost ceiling is placed at 1.50, Traffic A will produce revenues for the railway of $600 ($400 of variable cost times 1.50) which together with the revenues from Traffic B of $425 will yield total railway revenues of $1,000 . However, these total revenues would be insufficient for the railway to recover its total costs of $1,050. Over the short term, the quality and level of service would deteriorate because the railway would be unable to attract the capital necessary to replenish its assets and, eventually, in the absence of government assistance, terminate service altogether.

4.0 Implications of Province of Alberta Proposal

The Province of Alberta has proposed that railway rates be capped by a revenue-to-variable cost ratio initially set at a ceiling of 1.90. The maximum ratio would progressively decline to 1.50 in the fifth year and remain at that level thereafter. The maximum ratio is derived from the fact that long-run variable costs represent about 80 percent of the railways' total costs, so if all traffic moved at a revenue-to-variable cost ratio of 1.25, the railways would be commercially viable. A maximum ratio of 1.50 means that the railways could charge up to twice the implied average recovery of constant costs. A railway could charge a rate that incorporated a higher ratio if it could demonstrate "effective" competition for the traffic, while rates for traffic moving under contract could also embody a ratio higher than the prescribed maximum.

Over and above the consequences on both shippers and railways of a maximum rate ceiling as described in the preceding section, the proposal contains other implications that should be carefully scrutinized.

First, it postulates that the appropriate recovery of constant costs is tied to the variable cost of producing a given service. Variable costs are those costs causally related to changes in the volume of traffic such as the costs of fuel and crew wages; constant costs are the fixed costs of the railway that are not capable of assignment to any one particular service and that are incurred, for the most part, independently of reasonable changes in the volume of traffic. Bridges and tunnels, for example, are included in constant costs.

Constant costs are a quantum amount that is more a function of the size of the rail network than of the variable costs incurred to produce a given service. Because of this phenomenon, the lower the variable cost of producing a given service, the higher the recovery ratio towards constant costs that is required if the railway is to be commercially viable. For example, a railway will require a much higher recovery ratio of constant costs if all traffic moved at a variable cost of 2.0 cents per ton-mile than if the same volume of traffic moved at a variable cost of 5.0 cents per ton-mile given the same level of constant costs.

The fact that a rate is in excess of a prescribed revenue-to-variable cost ratio is not a priori evidence that it is out of proportion to other rates or is "unreasonable". For example, relatively higher constant cost recovery ratios do not automatically imply higher rates compared to those prices with lower ratios. A revenue-to-variable cost ratio of 1.75 would yield a rate of only 3.50 cents per ton-mile on a movement that incurred a variable cost of 2.0 cents, but a ratio of 1.25 would yield a rate of 6.25 cents where the variable cost was 5.0 cents. Further, due to the low level of variable cost associated with the move, a rate may incorporate a constant cost recovery ratio in excess of 1.50, yet still be insufficient for the commercial viability of the carrier if the railway were designed to carry solely that traffic. Whenever a rate is below the stand-alone cost of providing the specified service, regardless of its revenue-to-variable cost ratio, one of two conditions prevail: either (a) the rate is constrained by modal and market competition, or (b) the rate incorporates the economies derived from the joint utilization of the railway's plant and equipment with other traffics, the very benefits that value of service pricing yields.

The imposition of a maximum rate standard across all traffics based on the arbitrary notion that recovery of constant costs at twice the average required on movements overall is somehow "unreasonable" or "unfair" cannot be rationalized in economic terms. The determination of the fairness of a particular rate can be assessed only with reference to the attendant characteristics of the movement. Depending upon these characteristics, a rate for a commodity with a revenue-to-variable cost ratio of 1.60 can be just as economically efficient and fair as a rate for another commodity with a revenue-to-variable cost ratio of 1.40. It is, therefore, punitive to suggest that the overall level of railway rates be circumscribed by the imposition of a revenue-to-variable cost maximum rate standard.

Second, the imposition of a specified revenue-to-variable cost ceiling would introduce anomalies in the establishment of rates that are unrelated to the appropriate recovery of constant costs. This can be demonstrated with respect to car ownership. A shipper may pay a rate of, say, $12.00 per ton based on a variable cost of $8.00 per ton that includes a cost of $2.00 for car ownership. By electing to provide his own cars, the shipper would be able to receive a rate reduction of $3.00 per ton or $1.00 more than that implied from the transfer of the ownership cost of the cars from the railway to the shipper. (The new rate would be the $8.00 per ton original variable cost less the $2.00 per ton car ownership cost times the constant cost recovery ratio of 1.50, or $9.00 per ton.)

Thus, in the above example, the shipper who supplied his own cars would receive a net rate advantage of $1.00 per ton over a competing shipper supplied with railway-owned cars. This is notwithstanding the fact that the total variable cost of the competing movements is the same in both cases (regardless of how the variable cost is apportioned between the railway and the shipper), and that the level of railway constant costs would not be reduced by the implied $1.00 per ton savings attributable to shipper ownership of the cars.

Third, the Province of Alberta recognizes that its maximum rate proposal would put downward pressure on railway revenues, and in combination with other factors, "gives rise to a concern with overall railway viability". The Province therefore proposes that consideration be given "to identifying methods for improving railway contribution through increases in revenue or decreases in cost".(7) However, due to the mechanism of the proposed maximum rate standard, decreases in costs that fall into the variable component will exacerbate rather than improve the financial viability of the railways. This is because a $1.00 reduction in variable cost for a rate that is at the prescribed maximum will translate into a revenue reduction of $1.50 to the railway in spite of the fact that the level of constant costs will remain unaffected by the variable cost saving.

To illustrate, suppose a railway moves a given volume of a commodity at a rate that yields total revenues of $1,200. The variable cost of the movement is $800 and the railway's constant costs are $400, so the rate incorporates a revenue-to-variable cost ratio of 1.50 and the railway is commercially viable. If the railway were able to reduce the variable cost by 10 percent to $720 through the introduction of operating efficiencies, the prescribed revenues would fall to $1,080 ($720 times

1.50). However, if the level of constant costs were unaffected by the saving in variable cost, the railway would no longer be commercially viable. The railway would receive revenues of $1,080 and incur total costs of $1,120 ($720 of variable costs plus $400 of constant costs), a shortfall of $40.

The maximum rate standard proposed by the Province of Alberta would appear to offer few long-term benefits that are conducive to the provision of "an economic, efficient and adequate transportation system".(8) The issue of maximum rates is sufficiently complicated that it cannot be reduced to a simplistic revenue-to-variable cost ratio without incurring negative consequences for both the shippers and the railways. The adoption of a maximum rate standard such as that proposed by Alberta would undermine the benefits of value of service pricing, and ultimately result in deterioration in the quality of railway service to all shippers.

Footnotes

(1) Freedom to Move - A Framework for Transportation Reform, July 1985, available from Public Affairs, Transport Canada.

(2) The proposal is contained in Government of Alberta Supplemental Submission to the Government of Canada Concerning Proposed Changes to the National Transportation Act, November 1985, pp. 21-23. See also statement of Mr. Clarence J. Roth (Deputy Minister, Planning and Services, Department of Economic Development, Government of Alberta) to the House of Commons Standing Committee on Transport, December 2, 1985.

(3) The Crow's Nest Pass Agreement dated September 6, 1897 between the Canadian Pacific Railway Company and the Government of Canada specified, inter alia, that the railway would reduce its rates on grain and flour on traffic originating west of Thunder Bay and destined for Thunder Bay and points east by three cents per hundredweight in return for a cash subsidy to construct a line from Lethbridge, Alta. to Nelson, B.C. The agreement was subsequently entrenched in legislation as S.C.(1897) 60-61 Victoria, Chapter 5.

In 1925, the rates prescribed by the Crow's Nest Pass Agreement were legislated to apply to all railways subject to the jurisdiction of Parliament. In 1927, General Order No. 448 of the Board of Railway Transport Commissioners confirmed the application of the Crow's Nest Pass rates to grain and flour destined for Pacific Coast ports.

(4) A study prepared by Snavely, King and Associates for Transport Canada put the loss between the revenues received by the railways from statutory grain and the variable cost of providing grain service at $244 million in 1980. This loss is net of federal government subvention. Snavely, King and Associates, 1980 Costs and Revenues Incurred by the Railways in the Transportation of Grain Under the Statutory Rates, December, 1981.

(5) The Staggers Rail Act of 1980 (PL 96-448) declares that it is the policy of the United States Government, inter alia, "to promote a safe and efficient rail transportation system by allowing rail carriers to earn adequate revenues, as determined by the Interstate Commerce Commission".

(6) Freedom to Move, op. cit., p. 18.

(7) Government of Alberta Supplemental Submission, op. cit., p. 23.

(8) This phrase is the core of the statement of national transportation policy objectives set out in Section 3 of the National Transportation Act.