

TRANSPORTATION POLICY, COMPETITION AND ECONOMIC GROWTH *

Canadian transportation policy states that the best way to meet the needs of the Canadian economy and Canadians is to have a transportation system that is competitive, economic and efficient. The competitiveness of Canadian firms in Canadian, North American and world markets depends on the efficiency of the transportation system. The *Canada Transportation Act (CTA)* maintains the needs of users and the well being of Canadians in rural and urban Canada are met when transportation is provided in the most efficient way possible, namely, at the lowest total cost.

The *CTA* is also clear in stating that the objectives of Canadian transportation policy in serving the needs of users and advancing the well-being of Canadians are achieved, among other things, when rates and conditions do not constitute an undue obstacle to the movement of traffic within Canada or for export and that competition and market forces, both within and among the various modes of transportation, are the prime agents in providing viable and effective transportation services. In essence, the *CTA* provides that transportation services should be supplied at rates that cover the cost of providing transportation services. Therefore, both the users of transportation services and the providers of transportation services will have their respective needs met by a “competitive, economic and efficient national transportation system”.¹

While section 5 of the *CTA* is a clear statement of policy that competitive market forces should be the means of achieving the objectives of policy, the federal government has adopted differing strategies across modes for achieving those objectives. In rail and

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¹ See section 5 of the *Canada Transportation Act*.

trucking the government has moved for the most part to create structures that facilitate and encourage competition. In domestic aviation, competition has been the operational policy whereas in international aviation, section 5 seems to have been almost abandoned. In marine there is also a view to creating a competitive environment; the creation of Port Authorities is an example of shifting governance structures to facilitate more efficiency and promote competition. Given that Port Authorities operate in monopolistic market structures, it is important that they be subject to pricing and service discipline. A mere transfer from one public monopoly to another 'local' public monopoly would not be a desirable outcome, since the objective of the shift in governance is to improve both allocative and productive efficiency. The same might be said of some private port facilities.

In this paper our focus is on rail but the analysis can be applied more generally. We begin with a discussion of rates and service levels in markets that lack competition, including captive shipper environments. Following this discussion we examine pricing and service quality, with an emphasis on the latter, when there is market power. In the penultimate section, we examine the impact of pricing in competitive markets on output, as less attention has been paid to the impact of rate and service levels on industrial economic output. We conclude the paper with a discussion of the importance of intramodal competition. We note that exposure to increased levels of competition is needed to achieve the efficiencies desired for all other sectors of the economy and that increased intra-modal competition is superior to intermodal competition to realize allocative, productive and dynamic efficiencies.

Market Power and Competition

Rail operators have much greater levels of market power in some markets than in others. To be clear about this requires some consideration of market definition. In particular, can rail be defined as a narrow product market or should all surface transportation be considered? Grimm and Harris [1998] provide some insight. A

railway's 'products' consists of transporting different commodities between numerous pairs of "origins" and "destinations" (ODs). Therefore, a railway can be considered a multi-product firm where each product shipped between each OD is a unique product.

Market definition for rail services would depend on such features as the characteristics of the movement and the relative costs to users of truck, rail or marine, if available, and whether a shipper could switch to an alternative mode if faced with a significant price increase (or service level decrease). For any one shipper, the ability to substitute depends on distance to destination, product features and size or volume of shipment. Grimm and Harris [1998] argue that the key is that a rail carrier with a monopoly over a product can selectively raise prices (since prices can be set under confidential contracts) to specific shippers depending on the availability to a particular shipper, for a particular movement, of intramodal or intermodal sources of competition. For shippers with no competitive alternatives for one or more OD pairs, the market should be defined in terms of rail as a narrow separate product market. Further support for a narrow rather than a broad 'transportation services' market is provided by econometric studies that show rail rates are significantly related to rail competition but not to truck competition for certain commodities and distances. Grimm and Harris [1998] cite four studies that provide statistical evidence that the addition or subtraction of a rail competitor has a significant impact on rail rates. These studies use different data sets over different time periods and all were undertaken in North America.²

Source competition, product competition and geographic competition, while possibly tempering market power to some degree, are not a substitute for direct, intramodal competition.

² See Grimm and Harris [1998, pp. 139-140],.

Pricing and Service Quality with Market Power

While we would normally expect a seller with market power to raise price above marginal cost, the effects of market power on the quality of the products or services provided is less clear. In some cases even monopolists can have the correct incentives to provide efficient quality levels, comparable to those we would see in competitive markets. In other cases, monopolists may over or under-supply quality.³

The key determinant for the monopolist provider's quality choice is whether higher levels of quality will translate into a willingness of buyers to pay prices sufficiently higher to cover the additional costs of producing the higher quality.

However, in cases in which a monopolist's price is constrained to be somewhat below the full monopoly level, for example by a weak, but not completely ineffectual, regulatory regime, there is reason to expect the quality of services or products provided will be sub-optimal. In cases like these, the seller can effectively raise its price by lowering its quality to achieve a "quality-adjusted price". It is important to ask under what conditions under which a monopoly provider of some product or service will set a quality level that is too low, relative to the efficient level.

Higher levels of quality provide benefits, in the sense that the final product is more valuable when the quality is higher. However, quality is costly to produce. Just as there will be a socially optimal level of output for any given market, there will be a socially optimal level of quality for the product in that market. Here we want to compare the differences in output levels, prices and quality levels between what is socially efficient and what a monopolist would choose. The model is straightforward; consider the demand for the product depends on its quality and price, such as the rail rate and a

³ Clearly, it is costly to provide services of higher quality. The "efficient" quality level will be the one that optimally balances the costs of higher quality to the producers with the benefits of higher quality to the consumers. See, for example, Spence [1975].

consistent time to market, for example. We represent that relationship with the following linear function

$$P = aq - bX \quad (1)$$

In this function every unit increase in q (quality) raises the value to consumers (shipper) of every unit consumed by a units. The slope of the demand curve is given by the parameter b and quantity is given by X .

The cost of producing a unit of quality q is given by the function $c(q)$ which is increasing in q and is increasing at an increasing rate (i.e. increasing quality is more costly the higher the current level of quality – put another way, it gets harder and harder to continuously raise quality levels). In notation we denote the additional costs from increasing quality as $dc/dq = c'$. The rate at which these marginal costs increase is given by $d^2c/dq^2 = c''$. For simplicity, we assume that the cost per unit does not vary with changes in output.

We can now ask two questions about the price and quality levels in this market. First, what levels would be socially optimal in the sense that they lead to the greatest possible value to be created by the market? Second, what levels would a monopolist choose? With respect to the monopolist case we can further ask how the monopolist's decision on quality would be affected were its price to be pushed downward by a quasi-regulatory process.

Socially Optimal Levels

The wealth created by this market is given by the difference between the value of the output to users and the producer's cost of producing that output. More generally, we denote the full amount of wealth (or surplus) thus created by S , where it can be shown that here:

$$S = [aq - c(q)]X - bX^2/2 \quad (2)$$

Maximizing this with respect to the levels of X and q produce the following conditions:

$$P^* = c(q^*) \quad (3)$$

$$c'(q^*) = a \quad (4)$$

The first of these conditions is the familiar rule that prices (measures of marginal social value of output) should equal the marginal costs of production. The second condition says that the optimal level of quality, q^* , will be that which equates the marginal cost of increasing the quality of a unit, $c'(q)$, with the marginal benefit to users of slightly higher quality in a unit, which is a .

Unconstrained Monopoly Choices

The unconstrained monopolist will choose to maximize its profit, given by:

$$\Pi = [P - c(q)]X = [aq - c(q)]X - bX^2. \quad (5)$$

Maximizing this with respect to the levels of X and q produces the following conditions, where P_M is the monopoly price:

$$P_M = [aq_M + c(q_M)]/2 \quad (6)$$

$$c'(q_M) = a \quad (7)$$

In comparing conditions (3) and (6), it is clear that the monopolist will choose a price that is higher than socially optimal. However, given this structure, the monopolist will choose the socially optimal quality – compare (4) and (7) to see that $q^* = q_M^4$; will a monopolist always provide the socially optimal amount of service quality even while setting supra-competitive prices?

Constrained Monopoly

While equations (3) and (7) showed that the unconstrained monopolist need not under-provide quality relative to the social optimum – constraints on the monopolist's pricing, even weak ones,

⁴ Key to this result (that the quality choices are the same) is the fact that we have assumed that an increase in quality increases the value of every single unit by the same amount – *i.e.*, that it pushes up the demand curve in a parallel fashion. If, instead, increases in quality also steepened the demand curve (by pushing up the left side more than the right) the monopolist would choose a lower level of quality than is socially optimal. On this, see Spence [1975].

can lead to lower qualities. This example would appear relevant to the situation facing a rail shipper given that the various shipper remedies available under the CTA – particularly the provisions for Final Offer Arbitration (FOA) of disputes – may have the effect of constraining rail prices somewhat below their profit-maximizing levels.

In this case, if P^F is the constrained price level, the seller's profit function is given by:

$$\Pi = [P^F - c(q)]X = [P^F - c(q)](aq - P^F)/b \quad (8)$$

Choosing q to maximize profits now will lead to the following condition:

$$c'(q^{MF}) = a * [P^F - C(q^{MF})]/[aq^{MF} - P^F] \quad (9)$$

It is easy to show that the term $[P^F - C(q^{MF})]/[aq^{MF} - P^F]$ is equal to one when price is at its profit-maximizing level as given in (6) above. The term is less than one if price is suppressed at all below that level.

This tells us that if prices are held below their fully unconstrained profit maximizing levels, for example by an FOA process, the monopolist would respond by lowering quality below efficient levels. And as prices fall further below P_M , the lower quality levels will be.

This is a particularly important result since it shows that in the limit if prices are set at or near marginal costs, say for example under an FOA award, the shipper will be worse off due to the rail carriers' impending ability to provide lower service quality. Further it is important to note that even if the rail carrier's offers are consistently accepted in the FOA, these "winning" rate levels may still be, and indeed are most likely to be, below the levels that would maximize the carrier's economic profits in the absence of any constraints.

This does not mean that regulatory constraints on rates should be abandoned, but it does mean that users of the remedy, and policy makers, should be aware that a knock-on effect is to incent the rail carrier to reduce service levels, for which a different regulatory remedy may be required or which the shipper/user may have to endure or both.

Economic Growth and Competition

In the previous section, we argued that competition, specifically intramodal competition, would lead to socially optimal price (and service quality) levels. It is also possible that a firm with market power which has its profit maximizing price constrained has an incentive to lower service quality to in effect raise the quality adjusted price to a profit maximizing level. Under such circumstances there are real costs to not simply the customer but to the broader economy.

A decrease in service quality can harm customers in a number of ways and these can arise in the form of direct or indirect costs. Direct costs might include paying downstream suppliers in the distribution chain where contracts have been established for services on given days or for a selected period. For example, for exported commodities, a failure to deliver to the export facility on time may result in vessel demurrage charges. In some cases delays might result in restoring or re-handling products or product degradation such as spoilage or deterioration. These are direct out-of-pocket costs.

Indirect costs might include reputational harm due to a failure to meet contractual obligations to downstream customers. This can lead to lost sales, contractual penalties and increased resources deployed to overcome reputational harm. To offset these disadvantages, a shipper may have to lower price relative to its international competitors, losing margin that would flow to rivals, usually offshore. To make the point, for many customers of shippers, it is necessary to receive a regular input delivery flow. These buyers, frequently offshore and able to purchase from other international sources, will maintain inventories of key inputs to meet their production needs. If deliveries are not regular and predictable, these buyers will have to stock larger inventories to ensure smooth production. The buyers will then look to suppliers (shippers) that are more reliable or will push the higher inventory costs back onto the shipper, often by paying lower prices.

Another indirect cost is associated with the time value of money – revenues received in the future are worth less than the same revenues received today. While it may be true that a shipper product not

delivered in one period is nevertheless still available for sale later there is a significant opportunity cost from the period's lost sale, one that may not at all be made up in the future.

The following are effects of sales lost in a current period due to poor service:

- (i) in periods of high product prices there is a high probability that the product, when it is sold, will fetch a lower price and the differences between those prices is profit opportunity lost to a shipper;
- (ii) when the direct costs to downstream suppliers are particularly high, the costs of the delay are higher for the shipper;
- (iii) when the distribution system is capacity-constrained to the point that a tonne not shipped today cannot be made up for until the shipper shuts down, the time value of money implies losses to the shipper from these delayed receipts; the costs of the delay in receipt of the revenues from this tonne in case (iii) will increase the longer the shipper stays in business, to the point where the time value is reduced to near zero.

Impact on Economic Growth

Both higher prices and lower service quality can result in increased shipper costs. These increases can be direct or indirect. Such higher costs have an impact on shippers and on the Canadian economy. In this section, we consider the latter impact.

There are several considerations in an effects analysis. There are two (vertically-related) markets relevant to such an analysis. The first (the "input market") involves the provision of the transportation services the shipper requires to get its product to customers, some or most of whom may be overseas. The second is the "output" market for the product produced by the shipper.

The analysis considers the effects of higher costs for transportation services on the (economic) efficiency of the market for a shipper's

product. By efficiency we mean the difference between the value of the output produced and the true economic (or “opportunity”) costs of producing and distributing that output. In the analysis we assume the shipper is a “price-taker” in its output market, meaning that it will charge prices for its product that are determined by the market and that are largely beyond its control. Under this assumption, the market value of any lost (or extra) output produced by the shipper can be approximated by the current world price.

The principal economic effects of a cost increase to the shipper will come in three forms: lost shipper profits as a result of higher costs paid by the shipper for current volumes; lower shipper profits as a result of a reduced demand for its product in the downstream output market due to higher costs; and, lost contribution to the transportation service provider as a result of the volumes lost in the output market. Secondary cost effects will depend on the underlying cost structure of the shipper’s production process, capacity utilization and cost structure of the transportation service provider. If the shipper has any amount of returns to scale, reducing output will result in increases in average costs, which will further squeeze profits. Similarly, the transportation service provider will experience a possible increase in unit costs depending on sale and density economies. All of this adds up to a significant reduction in economic welfare in Canada.

Conclusions

The goal of deregulatory initiatives in transportation and other industries has been to replace the control of pricing (and other business behaviour) by costly regulatory processes with control by the market – but a key here is that for this to enhance welfare the markets must be competitive. The CTA recognizes the role and importance of competitive markets to generate efficiency and competition as an objective of transportation policy.

There have been many successes where markets can be competitive, but in some cases competition has not been possible; such is the case with captive shippers. Anticipating the problems of captive shippers, Canada’s national transportation policy, as expressed in the *CTA*,

provides for several regulatory remedies, each of which, if and when applied, can – in principle – overcome the negative effects of captivity (high prices and/or low quality of service). The remedies provided in the *CTA*, are (i) regulated and extended interswitching, (ii) competitive line rates, (iii) final offer arbitration and, possibly, (iv) running rights. Of these four, only regulated interswitching and final offer arbitration have proved somewhat useful.

We have shown that in the case where a transportation service provider with market power is constrained in setting a price by a process such as final offer arbitration, there is an incentive to lower service quality to effectively set a quality-adjusted price equal to that which would occur in the absence of a restraint. Under these circumstances shippers are worse off, as is the Canadian economy. The results make the point that such regulatory processes are not a substitute for competition, specifically intramodal competition, such as could be established under a viable running rights regime in certain cases.

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