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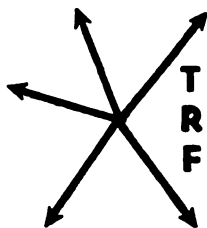
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TRANSPORTATION RESEARCH FORUM

Transport Subsidies: An Overview

by John Heads*†

INTRODUCTION

IN HIS NOVEL *Nunquam*, Lawrence Durrell writes on the subject of economics as follows:

*I am worried about the young. . . . They are all studying economics. They are all taking degrees in it—you can get them anywhere now. Now you know and I know that economics isn't really a subject at all. But the mental evolutions necessary to study it can easily fix one at the anal stage for the rest of one's life. And people fixed at the anal stage are a danger to humanity.*¹

We are gathered in Winnipeg this week to consider the general theme of "Transportation Efficiency: The Impossible Dream." Perhaps, there would be some justification in Durrell's strictures, if economists were to limit their dreams on transport policy to conditions of economic efficiency. The efficiency criterion would imply that government intervention in the transport markets—whether by subsidy, regulation or public ownership—should be concerned only with the economic allocation of resources. The efficiency objective would be to achieve roughly competitive solutions in situations where competition does not prevail as a result of such factors as monopoly power in the transport modes and economies of scale which allow unit cost to fall as output increases.

However, this narrow interpretation of the objectives of transport policy is hardly realistic. Since Confederation itself, the federal government of Canada has regarded transport as an important means of securing national objectives. In the nineteenth century, government had relatively few tools available to influence development and railways, together with the tariff and western settlement, were the three main planks of Macdonald's national policy.

This role for transport is, of course, not unique to Canada. In a recent issue of *Land Economics*, Robert W. Harbeson wrote:

In view of the uniquely important

*Canadian Transport Commission.

†The author is solely responsible for the contents of this paper, which do not necessarily reflect the views of the Canadian Transport Commission.

*and pervasive role of transportation in the functioning of modern economics it may be questioned whether it would be practicable to insulate transportation policy from other social policies. . . . assuming this were desired, but in any event the issue is academic. The transport policies of the United States and virtually all other countries have almost from the beginning reflected, explicitly or implicitly, various economic and social objectives in addition to the competitive pricing standard.*²

Similarly, the recent remarks on regulation of Paul Weaver, an Associate Editor of *Fortune*, apply equally to other forms of government intervention in the market place:

*The real purpose of government regulation is not to correct the deficiencies of markets. . . . government regulation is not economic policy but social policy. . . . (That is why all economists, whatever their political views, end up being so critical of government regulation, at least as it works out in practice. They think that regulatory policy should make sense economically—which, of course, it never quite does.)*³

At the outset, it should therefore be stressed that the rationale of government interventions in transport markets must be found in the area of broad social policy and not purely in terms of economic efficiency. This is perhaps more obvious in the area of subsidies than in many other areas of government intervention.

ECONOMIC CONSIDERATIONS

The general economic case against subsidies rests primarily on the argument that competition can achieve an economically optimal allocation of resources and that subsidies therefore cause costly distortions from this optimal situation. However, it is recognized that, where competition is not perfect, subsidy intervention may be justified on economic grounds. The major argument for subsidy of this type relates to industries characterised by increasing returns to scale. Typically, a large volume of capital investment is required before

production can commence at any level. Once this initial capital investment has been made, additional increments of output can be achieved at low marginal cost. Average cost pricing would be necessary if total costs were to be covered but, to maximize the excess of benefits over costs, price should be equal to marginal cost with the shortfall in total costs met by government subsidy.

The argument is developed in the form propounded by Pigou more than fifty years ago and illustrated in the familiar diagram below.

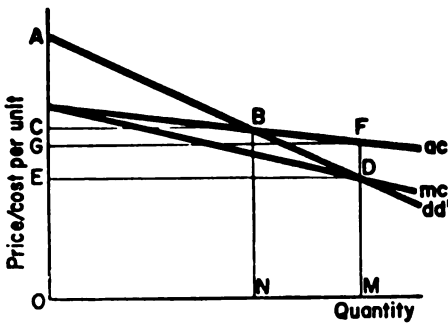


EXHIBIT 1

The demand curve is dd' , the declining schedule of average costs per unit of output is ac , and the marginal cost curve is mc . If the industry covers average total costs and there are no opportunities for price discrimination, output will be ON at a unit price of BN . The consumer surplus is ABC . Now let price fall to DM where the demand schedule intersects the marginal cost curve. Output increases to OM and the consumer surplus to ADE . Price now falls short of average cost by FD and a subsidy of $GFDE$ has to be paid to cover total costs. This subsidy is justified on the grounds that the payment is less than the increase in the consumer surplus of $CBDE$.

This is the simple economic case for subsidization of industries with increasing returns to scale. Leaving aside the complicated issue of "second best" solutions, there is the question of the extent to which economies of scale exist in the transport industries.* If economies of scale are slight, there is a very little welfare gain to be made by marginal cost pricing. On the basis of investigations of the trucking industry in the United States and Canada, the general

* Because of space limitations, there is no discussion here of economies of scale in the form of more frequent service, as distinct from economies in the form of falling unit cost of provision of service.

view seems to be that economies of scale are unimportant.⁴ The same argument has been advanced in respect of the U.S. airline industry⁵; work is currently underway to examine the comparable position in Canada. Pipelines undoubtedly do exhibit economies of scale,⁶ but so far in Canada these are used only for oil and gas and there are no long-distance solids pipelines operating here.

The most controversial area in respect of economies of scale is presumably that of rail transport. Writing in 1920, Pigou stated the case for believing that increasing returns to scale existed in this mode.

Among railways there is ground for believing that, at all events until considerable development has been reached, this condition is generally satisfied. The reason is that the fixed plant of a railway cannot, in practice, be so made as to be capable of effecting less than a certain considerable minimum of transportation. The aggregate costs of arranging for rail transportation for one ounce per week are very nearly as great as those of arranging for the transport of many thousand tons. For the same heavy expenditure must be undertaken for surveying and legal charges, bridging valleys and torrents, tunnelling through rock, erecting stations and platforms, and so on. This implies that the law of decreasing supply price acts strongly till a large investment has been made, and afterwards less strongly.⁷

As late as 1953, Klein was giving econometric support to the view that increasing returns to scale existed in railway transport.⁸ However, the proposition of declining marginal cost in railway operations was not universally accepted and was queried, most importantly, by Lorenz in 1916, Healy in 1940 and De Melverda in 1952.⁹ The argument still continues, but the balance of opinion is moving towards the view that the scope for economies of scale is less in railway operations than had previously been supposed. Hopefully, the current Canadian Transport Commission investigations of railway costing methodologies will clarify this further.

As a concluding comment on economies of scale in the various transport modes, it is worth referring to the work of Mohring with his important conclusions that transport subsidies are most easily justified if economies of scale are great and the elasticity of demand for the service is high. The net social benefit from subsidy rapidly disappears as returns to scale become slight. As re-

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turns to scale are not identical for all transport modes, Mohring argues correctly that "sound economic principles" do not dictate that "all modes receive equal treatment" in respect of transport subsidies.¹⁰

The other economic arguments for transport subsidies rest mainly in the area of external benefits which a good transport system can bestow in terms of an increased division of labour and a greater rate of economic growth. This was a very important argument in the early days of the railway, and the strategic role of transport facilities could perhaps still be argued in respect of the remote areas of Canada today. However, for the settled parts of the country it would be difficult to argue that an increase in transport facilities *per se* would have this strategic effect. As George Wilson stated in 1970, "general improvements in efficiency and acceleration of the growth rate . . . for Canada as a whole will receive but marginal support from improvements in transport under present circumstances."¹¹

SOCIO-ECONOMIC CONSIDERATIONS

The paper now turns from the pure economic efficiency justifications of transport subsidies to broader social issues and, for ease of presentation, considers firstly general socio-economic benefits, then income redistribution and finally regional development. Inevitably, there is some overlap between these different classes of benefits.

The socio-economic benefits claimed for transport have always been considerable and varied, including such fundamental considerations as promoting political unity and national defence. Transport has also been regarded as a "merit" good in itself. Transport allows workers to live outside congested urban areas, it facilitates outdoor recreation, it is educational and so on. The external benefits of transport need not be confined to users: for example, much of the benefit of urban transit systems is credited to non-users in terms of reduced congestion on the roads. More disputatiously, non-users benefit from the continuation of uneconomic passenger train services, because these function as a form of transport insurance and because even non-users are alleged to obtain some vicarious pleasure just from contemplating the continued existence of passenger trains.

Transport subsidies can also be used as an income redistribution mechanism, taking income from the general taxpayer and subsidizing users of specific services. In general, there is a presumption in

economic theory against income redistribution by subsidizing specific products on the grounds that a consumer's welfare is maximized if he is free to spend income transferred to him on any goods and services he pleases rather than on transport specifically. However, in special cases there can be justification for redistributing income through specific subsidies as distinct from money transfer payments. These special cases include industries where increasing returns to scale exist and encouragement of the consumption of "merit" goods. In addition, there are cases where government can make income transfers by providing specific products free or at subsidized prices, while a simple money transfer payment would not be politically acceptable.

From the standpoint of regional development, transport subsidies can be used to reduce the extent of inter-regional disparities. However, the potential in this direction would be slight if the only effect were to reduce consumer prices. For the Prairie Provinces, the Ratten Commission concluded in 1968 that rail freight charges were in the general range of about 2% to 13% of the wholesale price for most consumer goods.¹² Taking an average of 7% and making the broad assumption that transport charges through all modes affected half of total consumer expenditure on goods and services, transport charges would be equivalent to 3½% of total expenditure. Even a 25% reduction in transport charges would only increase real income by 1%. With shorter distances to the Atlantic Region from Central Canada, the effect there would be even less than in the Prairies. But a reduction of consumer prices is not, of course, the prime objective of transport subsidies in respect of inter-regional disparities.

The major regional development justification for transport subsidies is to bring employment to otherwise unemployed resources. A formal version of the argument would run as follows. As a result of rigidities, factor prices do not fall in depressed areas of Canada to the extent necessary to achieve a full employment of resources. Moreover, as a matter of social policy, the people of Canada would not wish to see wage rates fall, for example in the Atlantic Region, to the extent necessary to achieve full employment or labour there. The downward inflexibility in wages is accompanied by labour immobility so that unless special action is taken labour will be unemployed. One way to encourage employment in such areas is to secure a reduction in transport rates on products being sent out of the area to other

parts of Canada. Thus, in the Atlantic Region, freight assistance is given on shipments from the region to the rest of Canada.

The conventional response to this argument is that it would be more efficient to provide funds directly for regional development rather than subsidize application of a specific input such as transport. Yet, this is a criticism more easily offered in theory than corrected in practice, as the scope for stimulating regional development without stimulating a specific factor input is often very limited. For example, a major government tool for regional development has been capital grants and there are obvious dangers of resource misallocation in trying to promote employment by stimulating heavily capital-intensive projects. Research has recently been carried out by the present author on the case where a firm's sales in a slow growth area of the country are constrained primarily by transport costs incurred in reaching distant markets. Under these circumstances, if transport costs are a high proportion of wholesale prices, it can be more economically efficient to subsidize transport charges than product price or other factor inputs used by the firm.¹³ However, transport costs are not normally a large part of the costs of manufactured products¹⁴ and many regional development problems are not primarily attributable to transport considerations.

port modes by all levels of government in Canada.

It is always very difficult to determine the split of benefit of transport subsidies between carriers and users, but it seems less controversial to claim that the bulk of the subsidies covered in Exhibit 2 were aimed at social objectives outside the transport field rather than at transport efficiency itself. Of the subsidy payments made to the railways, approximately 60% were for uneconomic passenger services and in 1976 subsidy was running at 12.1¢ per passenger-mile. This may be justified on the grounds that railway passenger services cannot be run without subsidy and that these services are necessary for non-economic reasons. However, passenger train subsidies cannot be explained in terms of economic efficiency requirements, as resource allocation criteria alone would presumably demand a general discontinuance of these services. The remaining railway subsidies are paid mainly in respect of traffic originating on uneconomic Prairie branch lines; effectively this means in part a subsidy for Crow's Nest Rates on grain originating on such lines. There was also a payment of \$17 million for subsidies on rail movements under the Maritime Freight Rates Act. Again, the objectives are social in the form of income redistribution and regional development rather than required in terms of economic efficiency.

SUBSIDY PAYMENTS

Exhibit 2 shows Federal Government direct subsidies to transport carriers in the year 1976. The total subsidy payments amounted to \$428 million, although as we shall see later this represents only one-sixth of total direct and indirect subsidies provided to the trans-

Water subsidies, running at \$103 million in 1976 were mainly in respect of subsidies on water services in Atlantic Canada. Indivisibilities in the provision of vessels are not such as to allow the bulk of these subsidy payments to be explained in terms of marginal cost pricing, following an initial decision to make a capital investment. The subsidies must therefore again be regarded as mainly for reasons not connected with the economic efficiency of the transport system. Payments under the Atlantic Region Freight Assistance Act, totalling \$25 million in 1976, related to highway transport and again the objective was regional development rather than transport efficiency.

However, on latest data, regrettably for 1973, direct subsidies to carriers (then running at \$305 million) represented only one-sixth of transport expenditures made by all levels of government that were not recovered from user charges. The gross expenditures of all levels of government—federal, provincial and municipal—on transport totalled some \$3.9 billion in 1973. The various levels of government were left with \$1.9 billion of transport expenditures that were not recovered from user

FEDERAL GOVERNMENT DIRECT SUBSIDIES TO CARRIERS, 1976

	\$ million
Rail	298
Water	103
Atlantic Region	
Freight Assistance	25
Air	2
Total	428

Source: *Canadian Transport Commission*.

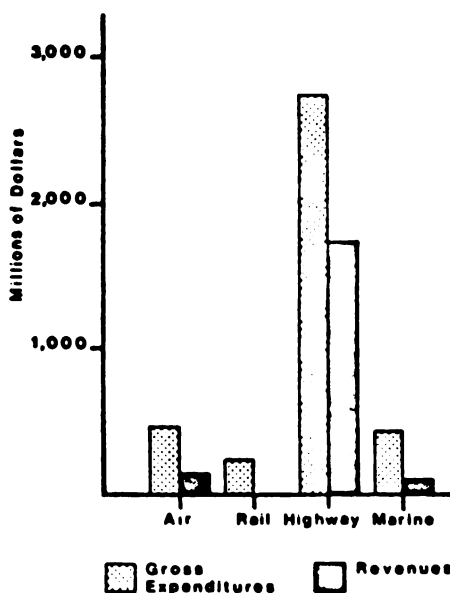
EXHIBIT 2

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charges. The distribution of these expenditures by mode and the amounts recovered from user charges are shown in Exhibit 3. Of the unrecovered expenditures, the highway mode accounted for some \$960 million, with these predominantly a provincial government responsibility. The air mode accounted for \$360 million, marine for \$320 million and rail for \$220 million.

It has already been suggested that the direct subsidies to carriers, included in these figures, were given for reasons other than the promotion of economic efficiency. All subsidies on the rail mode are paid directly to the carriers and most of the indirect subsidies on other modes relate to the provision of capital infrastructure by governments, where the costs are not fully recovered from user charges. It would be difficult to argue that in the highway, air and marine modes, indivisibilities are such that these high levels of indirect subsidy are unavoidable, if service is to be provided. The subsidies are given mainly for social reasons rather than for considerations of transport efficiency.

**GOVERNMENT TRANSPORT
EXPENDITURES AND REVENUES
BY MODE: 1973**



Source: Canadian Transport Commission. *Transport Review* (Ottawa: CTC, 1977), p. 50.

EXHIBIT 3

The case of the air mode is particularly interesting, as recent attempts to increase cost recovery through higher user charges suggest that the original reasons for subsidizing this mode are now less compelling. While heavy subsidy on airport infrastructure may have been necessary at one time to meet fixed costs that had to be incurred if Canada were to enjoy the benefits of air travel, the volume of air traffic on the main lines is now sufficiently great to make this need for subsidy no longer imperative. Moreover, subsidies on the air mode are regressive in the sense that the beneficiaries are mainly the above-average income groups.

CONCLUDING REMARKS

From this general overview of transport subsidies, it would appear that there is little need today for transport subsidies in Canada in order to meet economic efficiency criteria. Except for northern and other isolated parts of the country, transport services are sufficiently pervasive that transport no longer represents a strategic factor in the economy to be subsidized for its spillover effects. The data on economies of scale on rail transport is not definitive, but in general the transport modes present little evidence of theoretical need of transport subsidies to allow marginal cost pricing under conditions of increasing returns to scale; moreover, there is little evidence of subsidies being given for this reason.

Transport subsidies in Canada appear to be paid predominantly for social reasons unconnected with transport efficiency. The structure of subsidies may also suggest that subsidy needs, at one time required for economic reasons as in the air mode, are still being met even though the rationale is now much less compelling. In some cases, particularly where it is necessary to preserve minimum levels of transport services, the execution of income redistribution and regional development objectives can be secured through transport subsidies. On the other hand, the social objectives of many of the indirect subsidy payments seem to be somewhat unclear. Moreover, where the objectives are more defined, it is not always apparent that transport subsidies are the most efficacious means of reaching desired goals.

FOOTNOTES

1 Lawrence Durrell. *Nanquam* (London, England: Faber and Faber, 1970), p. 193.

2 Robert W. Harbeson. "Social Welfare and Economic Efficiency in Transport Policy." *Land Economics*, Vol. 53, No. 1, 1977, p. 97.

3 Paul Weaver. "Regulation, Social Policy, and

Class Conflict," *The Public Interest*, Winter 1978, pp. 56-7. This reference was kindly drawn to the author's attention by Mr. J. Hanley.

4 D. Phillip Locklin. *Economics of Transportation* (Homewood, Illinois: Richard D. Irwin Inc., 1966), p. 644.

5 George W. Douglas and James C. Miller III. *Economic Regulation of Domestic Air Transport: Theory and Policy* (Washington: The Brookings Institution, 1974), p. 17.

6 G. M. McLaughlin. "Applications, Technology and Economics of Slurry Pipelines," *The Logistics and Transportation Review*, Vol. 8, No. 3, 1972, pp. 69-81.

7 A. C. Pigou. *The Economics of Welfare*, Fourth Edition (London: Macmillan, 1948), p. 310.

8 Quoted in A. A. Walters. "Production and Cost Functions: An Econometric Survey," *Econometrica*, Vol. 31, 1963, p. 31.

9 For a fuller discussion, see John Heads, *The Economic Basis for Transport Subsidies*, (Ottawa: CTC, 1975), pp. 15-24.

10 Herbert Mohring. "Transport Subsidies and the Economic Development of the Atlantic Provinces," in K. W. Studnicki-Glabert (editor), *Issues in Canadian Transport Policy* (Toronto: Macmillan, 1974), p. 298.

11 George W. Wilson. "The Role of Transportation in Regional Economic Growth," in E. W. Tyrczniewicz and Om P. Tangri (editors), *Transportation and Regional Development: Proceedings of a Conference* (Winnipeg: Centre for Transportation Studies, University of Manitoba, 1970), p. 60.

12 Canada, Prairie Provinces Cost Study (Batten) Commission. *Report of the Royal Commission on Consumer Problems and Inflation* (Regina: The Queen's Printer, 1968), p. 124.

13 John Heads. *Transport Subsidies and Regional Development*. Unpublished Ph.D. thesis, University of Manitoba, May 1976, Chapters IV-VI.

14 *ibid.*, pp. 145-152.