the merit of the Canadian administration of elections, especially in the matter of costs, is due principally to two factors: one is the centralized and uniform control over registration and election matters in the hands of the Chief Electoral Officer; and the other is the emphasis which is placed on a regular, uniform schedule of fees and expenses administered under the control of the Chief Electoral Officer and the Auditor-General. The combination of centralized control, economical standards, and experienced personnel has given Canada a relatively economical and satisfactory election administration.

Highway Costs and Motor Taxation

By Gilbert Walker

I

COMPETITION between highway carriers and railroads has become a universal condition—certainly it is found in all developed communities. Everywhere there have arisen the same awkward problems, among them the question of highway finance. A highway is an expensive piece of equipment, and costs a great deal to construct and maintain. In many Provinces of the Dominion, and States of the Union, debt incurred to finance highway construction accounts for the larger part of public liabilities, and annual expenditure upon upkeep is the heaviest charge upon the public revenues.

The highway is owned by a public authority, and it is used by many classes of people, and for many purposes; by the general public going about their ordinary affairs, by government, by the private motorist and the business man, and by the commercial motor operator. It is furnished originally for all, and primarily for none, though the elaborate construction of the modern highway has been undertaken mainly for motor traffic. All citizens, and all vehicles, have equal rights upon the highway, and none have a prior claim. Out of this there arises the problem, what share of the common costs of the highway shall be assigned to each party?

The case of a railway raises the same problem though in a different form. A great proportion of the expenditure of a railway, costs of constructing and maintaining track, road-bed, and so on, is overhead, incurred in common for all traffic carried. These charges are parallel to the costs of building and keeping up highways. Unlike the highway user, the railway both owns the track and carries the traffic. Railway managements can be, and often are, expected to undertake the whole outlay involved in working the service. It is their usual practice to distribute the common overhead costs of the railway between the different classes of traffic carried, rather than between the several types of vehicles in which it is conveyed, the plan upon which highway authorities are proceeding.

II

As political and economic circumstances dictate, the highway authority may consider, as in Great Britain, that motor traffic is a proper object of sumptuary taxation, and raise each year a much greater revenue from the motor user than is being spent upon the road; or in sparsely settled areas, the government may deem it desirable to encourage the growth of highway communications by levying in taxation very much less than what is being spent. There is no com-

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pelling reason of politics or economics which demands that revenue from taxation of motor vehicles shall be any particular proportion (or multiple) of what is spent each year on highways. No rule can be laid down; in each case the relationship between receipts of motor taxation and annual expenditure must depend upon the economic conditions and political exigencies of place and time.

It is often recommended that the yield of motor taxation should equal expenditure upon highways, less, possibly, a small deduction to balance the rights of the non-motoring public. This is sometimes described as the application of the concept of a "public utility" to the highway. Taxation is considered 'fair' in the sense of this proposal when motor vehicles as a whole are taxed at a rate equivalent to the whole annual expenditure or 'cost' of highway construction and upkeep, and (most important) when the total tax burden is distributed between private passenger cars and commercial vehicles, trucks and buses, in such a way that the latter pay a share of the total, at least equivalent to the annual 'cost' of constructing and maintaining a highway suitable for this traffic, and capable of supporting the heavy loads involved. This proposition is accepted by railways, highway authorities, and truckers alike. Railway companies see in it the prospect of heavier financial burdens on their competitors; highway authorities larger revenues, and truck operators cannot deny the equity of the suggestion. The idea appears simple, but translation into the practical details of a tax schedule raises difficulties. Much ingenuity is expended in elaborate computations of the total annual cost of highways and in the allocation of shares between the several classes of motor user.[1] But expert opinion among highway engineers, as in other professions, can be found on both sides. Some support the railways who claim that taxes on trucks are unreasonably low, and others the truckers, who protest that taxation is already unfairly heavy.

The annual 'cost' of a piece of durable equipment such as a highway may be distinguished from expenditure laid out from year to year on construction and upkeep. The second is the amount actually spent in any year, both on capital and current account; the first, the sum of the provision which should be made annually to depreciate the asset to nothing over the period of its useful life, interest on the depreciated value of the capital sunk in construction, and the amount spent each year on maintaining the property in good condition. The original investment in a highway is large compared with what must be spent each year on maintenance—the former may be twenty times (or more) as much as the latter. Provision for depreciation thus becomes the most important part of "annual cost". That quantity will be small or great according as the highway is expected to last a considerable number of years, or must be replaced in very few. The time during which a given highway construction endures is governed by many things, weather, traffic, the state of repair in which it is normally kept and so on. Some of these factors depend upon events the course of which cannot be forseen. A road, built to give service over a certain period may become obsolete in much shorter time if there is an unexpected growth of traffic; or it may be irreparably damaged in very few years if the highway administration has to economise on maintainance. On the other hand, if traffic never exceeds the volume and weight for which the structures were originally designed, and if an adequate sum is spent each year on upkeep, the highway may last indefinitely, and be as good at the end as it was at the beginning. The calculation of an exact figure for 'annual' cost demands assumptions about the likely term of the highway's usefulness, the justice of which cannot be known in advance, and which subsequently may become indefensible. Uncertainties such as these make "annual cost" an arbitrary

1. See particularly, the work of Messrs. Breed, Older and Downs, "Report on Annual Highway Costs, Province of Ontario". Made to the Railway Association of Canada, 1938.

figure and one open to dispute. It is consequently not a suitable quantity upon which to base a tax programme. Policy must be guided rather by estimates of annual expenditure, the second concept distinguished above, what should be spent from year to year to allow for the expected growth of traffic, and to keep the existing plant in as good condition as when it was new, plus an allowance to provide for the service of debt including amortisation at whatever rate is deemed practicable or desirable.

III

The total expenditure upon highways, however it be measured, is, for the greater part, "overhead" in respect of any particular user or class of users; an outlay incurred *in common* for all users. But for the advent of motor cars, the needs of the public for roads might have been satisfied with a light and inexpensive construction. Modern motor traffic demands solid foundations, good pavements, and easy curves, and the surface must be kept up to a high standard. The sum laid out upon these structures, and to make good extra wear and tear caused by motor traffic, is the "cost" falling upon the highway authority on account of the motor user. Heavy commercial traffic calls for additional work upon foundations, requires thicker, wider pavements, gentle curves and easy grades; and makes greater demands for maintainance. This expenditure is the "cost" of adapting and improving a motor highway to make it suitable for commercial traffic. But a highway capable of carrying heavy vehicles could not be constructed for this sum alone. To do that requires an outlay equal to the whole expenditure currently being made upon motor roads. The cost of accommodating any particular type of traffic on the roads is the sum which would be saved if that class were to be excluded, the increment of outlay required to adapt the highway to the special requirements of that class.[1] This is all the expense to which the highway authority is put if this type of traffic is to be allowed, *in addition* to what must be spent in any case to get a highway suitable for all the other traffic expected on the road. It is therefore the cost to the authority of providing for that traffic. The cost of some types of traffic might therefore be nil, as when motor cycles or very light cars are allowed on a highway built to carry the heaviest vehicles. In the case of traffic in trucks and buses, the specific cost is certainly a positive quantity; but still probably only a small part of the total expended upon highways. No part of what is spent to provide a highway for public use alone, nor the larger sum demanded by a motor road suitable for private cars and light trucks is included in the (specific or differential) cost for which heavy commercial traffic is directly responsible. None of this expenditure would be saved were the heavier vehicles to be excluded from the roads; and none is specially undertaken on their behalf. The only charges for which heavy vehicles are solely responsible, and which therefore can be reckoned as the cost of providing for commercial traffic is the outlay directly incurred in widening, straightening and strengthening a modern motor highway, and in making good wear and tear, the result of the passage of these vehicles. The Chevrier Commission in Ontario put these charges at 7% of the total outlay in that Province.[2] If this estimate be accepted, the remaining expenditure, (93%) must be undertaken if a road is to be got suitable for any motor traffic at all. The sum of the specific costs for which the parties liable are severally responsible will not, of course, amount to more than a small part of the whole expenditure. The rest of the outlay, the greater part if the computations of the Commission are correct, is an overhead, incurred in common for all types of motor traffic, and not specifically for any one. All users benefit, and all can be asked to contribute; but there is no means whereby

1. This quantity is sometimes called the specific or differential cost, to distinguish it from average cost, a figure obtained by dividing the whole outlay expended on production from first to last, by all the units produced. See last paragraph of Section III.

2. Note. Report of Royal Commission of Transportation, Province of Ontario 1938, p. 11 and p. 228.

shares in an expenditure such as this can be assigned to each as a *cost*. The *cost* of providing for any class of vehicles is the extra outlay incurred specifically because the road is to be made suitable for them, outlay which could otherwise have been saved. Cost in this sense, specific or differential cost, must be distinguished from "average cost per vehicle", the average expenditure per vehicle laid out on the highway. This is a figure which can be obtained by simple division; but that is a suitable method of allocating a common overhead charge only if equipment is being used to capacity, or if the number of users does not vary; and if the use made by each is substantially homogenous with that made by all others. None of these conditions is fulfilled in respect of traffic on a highway.

IV

A highway, designed to support a given maximum axle load, can carry a great volume of traffic of that weight or less; and it must be built up to that standard if any such axle loads are to be permitted. Otherwise the pavement will be broken and the foundations wrecked. To carry any commercial traffic at all, expenditure upon additional structures must be undertaken. This expenditure is necessary if a minimum of trucks and buses is to use the highway; but the highway as improved can withstand without damage a density of traffic very much greater than the minimum. For a considerable range of traffic therefore, not exceeding the maximum axle load for which foundations and pavement are designed, the costs of constructing the highway are invariable. No more need be spent, because a greater volume of traffic is expected, nor can anything be saved if the density is going to be less. If foundations and pavement are made strong enough from the first to support the weights allowed, the factor mainly limiting the increase of traffic is congestion of the highway. Congestion can be relieved and the capacity of the highway increased only by building additional carriageways, or parallel roads of an equal standard. Up to the point at which this outlay must be incurred, the costs of the highway are constant whatever the volume of the traffic.

In relatively thinly populated communities it is reasonable to assume that highways are far from being congested. The only expense incurred therefore if one more vehicle is permitted to use the road, and the only charge saved if one were removed is the sum required to make good the extra wear and tear caused by the passage of that vehicle. This, a very small quantity,[1] is the "cost" of allowing the individual truck or bus to run over the highway. All the remaining expenditure, substantially the whole, both that incurred in common with all other traffic, and that undertaken specially for any particular class, is a fixed charge, "overhead" in respect of any particular vehicle, private car, truck or bus. The sum of the costs incurred on behalf of each vehicle separately, like the sum of the specific costs of providing for each class, do not amount to the total outlay on the highway;[2] and if the object of tax policy is to recover in revenue what has been laid out, it follows that the concept of a 'cost' per vehicle cannot be used to determine or justify tax schedules. In sparsely settled communities, truck registrations as a general rule are increasing. The duty upon each therefore, if made dependent upon average cost, should *fall* as number rise. If it is intended that the tax should remain stable over a period of years, the rate must depend from the first upon estimates of what is the expected average annual number of registrations throughout the useful life of the highway. Neither quantity can be predicted with any assurance. Scales of duty reached in this way will be just as arbitrary, as

1. Not only small, but also, apparently, difficult if not impossible to estimate accurately. In a (subsequent) work upon highway costs in the United States, prepared for the Association of American Railroads, Messrs. Breed, Older and Downs remark that "in general, these (maintenance) costs increase with traffic of a given pavement type, but there is no definite relationship between them... Attempts to correlate traffic and surface maintenance costs often have inconsistent and freakish results. This is because there are other factors controlling these costs which often outbalance the effect of traffic."

2. The usual condition of "average cost" diminishes as output increases.

those calculated by any other method of allocating an overhead charge.

In densely populated communities as, for example, Great Britain and certain parts of the United States, it cannot be assumed that highways generally are free from congestion. Many roads must already be approaching, or have reached that condition. The introduction of more vehicles on these highways can only be at the expense of the 'road-space' occupied by existing users, and must delay the passage of all. The registration and running of additional cars, trucks, or buses, far from being nearly costless, now becomes exceedingly expensive. It is no longer a matter of allowing an (or some) extra vehicle(s) upon highways already there, capable of taking them and with space to spare, at a cost no greater than the small sum required to make good any additional wear and tear which may be caused. The highway is congested. More traffic consequently demands new roads, or at least additional carriageways. Congestion caused by a great increase in the number of private cars and small trucks can be met by the construction of a lighter type of carriageway for the exclusive use of these vehicles, and no provision need be made for commercial traffic. The whole of the additional outlay can, and should, be levied upon the lighter vehicles on account of which alone, the new highways were required, and are provided. But if the congestion is brought about by commercial traffic in heavy vehicles, then the strongest and most substantial type of new carriageway and roads must be built, or the pressure relieved by diverting private cars to other possibly less expensive highways. But many new highways which have to be built are demanded by the growth of heavy trucks and buses. The whole outlay upon new construction therefore becomes part of the specific or differential cost of provding for that traffic. If instead other traffic is diverted, the cost is no less. Heavy traffic has become the exclusive or primary user of the original and most expensive highway; the private car, crowded off this road, is compelled or induced to use other and possibly less convenient highways. The expense for which the commercial user is immediately responsible now includes the whole cost of the original highway plus an allowance for inconvenience caused to other users. This is measured by the difference between the worth of the first to the private user before it became congested and the lesser worth of the new road, or of the original in its congested state. The sum of these charges is the specific cost of providing for trucks and buses, and should be borne by the operators of these vehicles as their contribution to the expenses of the highway authority in addition to their share of the general overhead of the highway system. It follows from this that as commercial traffic increases to the point at which the highway is about to get congested with these vehicles, the cost of providing for additional vehicles rises steeply from the negligible item of extra wear and tear to the immense sum represented by the cost of new construction. This conclusion has an important bearing upon the rate of tax which is appropriate, and it should be borne in mind by those responsible for determining tax schedules.

V

This article attempts only to show that figures of 'cost' of highways per vehicle, or for each class of vehicle, however elaborately calculated, are not exact, indisputable quantities amounting in sum to total annual expenditure upon (or cost of) constructing and maintaining a highway system. Nothing which is said here can be taken to preclude a highway authority from raising in motor taxes all, more, or part of what is spent annually upon highways, plus interest and amortisation of outstanding debt. Each motor user, private and commercial, can be charged with a share of the common and constant expenses in addition to the specific differential costs for which he is directly responsible. But the idea of "cost" cannot be used to determine what these shares should be—some other

principle of distribution must be found.

The situation of a highway is similar in this respect to that of a railway, or any other enterprise which uses an expensive equipment to produce or dispose of an output diverse in character and not normally fully absorbing the whole capacity of the plant. The railway management, or business executive, expects (usually) that the total proceeds of carrying traffic or of producing and selling goods will cover the whole costs of operating the railway or of conducting the business, overhead as well as direct, and provide in addition for interest and dividends, replacement and expansion. The out-of-pocket expense, the specific or differential costs[1] that is, of carrying any given consignment are very small; the major part of the expense of running a railway is overhead. This overhead cannot be allocated as a cost, a sum which can be saved if the consignment is not conveyed, an expense incurred only if it were carried. The several traffics, or diverse outputs, are charged "what the traffic can bear", whatever can be exacted from shipper or consumer over and above the direct costs of handling and conveyance, or out-of-pocket expenses of production, limited either by public policy (in the case of the railway) or by the competition of other producers and similar articles. A highway authority is in the same position. Most of its expenditure is overhead, part only the result of any particular traffic. Like the railway company[2] the authority cannot use "cost" to determine what share each vehicle must pay over and above the very small proportion of expenditure for which that vehicle is directly responsible. Tax gatherers must fall back upon what can be exacted—what the traffic will bear; and what is just and expedient—public policy. Since, on the whole, a tax on transport is not a good method of raising revenue, the element of monopoly, what the traffic will bear, should play the smaller part and the element of public policy, what is just and expedient, the larger.

Compared with highway transport, carriage by rail is costly. It demands the exclusive use of a special track. This track has been expensive to construct, and a great deal is spent each year on upkeep. Road transport has involved no such outlay. Highway carriers can share the public road with many others. The cost of the additional structures and extra maintainance demanded by commercial traffic is often not a great proportion of the total. This is the "cost" of providing a track suitable for the carriage of goods and passengers by road. To this extent the commercial motor is a cheaper and more economic means of transport than the railway. It is made so just because highway carriers can share the public road with so little extra expense to the highway authority. This is a considerable advantage, and one of which the public should not be deprived by countervailing taxes on trucks and buses, without good cause.

The point at issue therefore, when a highway authority is deciding upon its tax programme, is not how should costs of highway construction and upkeep be allocated between the several users, whether in proportion to ton-miles run, vehicles miles, or any other of the bases considered by the Chevrier Commission. The question rather is this, how much of the economies represented by the lower costs of making a highway suitable for trucks and buses, compared with the sum laid out upon the railway track should the public be allowed to retain, and of how much should it be deprived by rates of tax on heavy commercial vehicles exceeding expenditure for which that traffic is responsible? Public policy is paramount in determining upon this issue; and public policy includes not only the fiscal question, how much revenue is it desirable to raise from

1. Marginal cost, in the language of the economist, if output is homogenous and units small.

2. Railway and highway authorities share this characteristic with all enterprise which produces a variety of output from a *common* equipment, and must make provision for a varying proportion of idle capacity. The exceptions to the rule are businesses which market a completely homogenous output, the product of a plant normally operating at its optimum capacity, (or at some definite proportion of the optimum), the single "firms" of economic theory.

commercial traffic as a contribution to highway expenditure (or to the public treasury) but also the transport question, what part is the truck and the bus to play in the immediate future, and to what extent should truck competition be restricted in the interests of the railway. Taxes may be levied, and duties imposed, solely to obtain a given revenue from motor users, and with no intent of affecting the relations between railway transport and motor users. But a tax system designed to resolve also the difficulties and inequities which beset competition between road and rail cannot be proposed until transport policy has been formulated. The equity and propriety of a given schedule of taxes cannot be judged except in relation to the purposes which it is intended to serve. Functions must first be distinguished, and traffic divided upon general principles of transport policy. When that has been done, rates of tax can be settled which will help to confine truck and bus operators within their alloted sphere. No general policy, universally applicable, can be outlined here, for what is appropriate depends upon the fiscal and economic conditions of the country, province or state concerned. Space does not allow the case of any particular community to be examined in detail; but in another place, the writer has endeavoured to apply this argument to the particular circumstances of the Province of Nova Scotia.

"Agricola": A Pioneer in Adult Education

By J. S. Martell

"AGRICOLA" would probably feel quite at home among co-operative leaders in Nova Scotia to-day. He too in his time, more than a century ago, told Nova Scotians that they could pull themselves into prosperity. The program he advocated was much narrower than that now being urged by the adult educationists of St. F. X.; but he was not far behind them in many of his methods of arousing the people to action. His appeal to self-interest, his call to local patriotism coupled with an attempt to create confidence in the resources and prospects of the province, and his emphasis on the necessity of practical education and the importance of mutual aid, the worth of work, and the love of the land are the very approaches used by some of the modern masters of the mass mind. The parallel extends even further. "Agricola," like the men of Antigonish, driven in part at least by fear of a foreign ideology, in his case the republicanism of the United States, came forward in a post-war period when an economic depression seemed to stimulate thinking in all fields, and, like them too, he was fortunate in finding a government ready to lend valuable support. His success also was spectacular, attracting the attention of people far beyond the borders of the province, while within the province his response likewise came mostly from the eastern counties and Cape Breton. Here the similarity ends, as well it might. "Agricola's" movement petered out in seven years, although the work was taken up by others in the decade after his death.

A detailed account of "Agricola" and his achievements having recently been published[1], little need be said about the man or what he did beyond the bare facts that he was a Scottish merchant named John Young of good education

EDITOR'S NOTE: J. S. Martell, Ph.D., is on the staff of the Public Archives of Nova Scotia at Halifax.

1: Bulletin of the Public Archives of Nova Scotia Vol. II, No. 2, Halifax, 1940.