

Pricing and Financing Highway Services

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●IN NEARLY every discussion about public policy one reads or hears statements regarding the need for more highways, more schools, more housing, more defense or more of almost anything except certain agricultural commodities. These statements are true if they are interpreted as meaning that more of each of these various goods and services, without loss of any other goods or service, would add to our general welfare. Such statements may not be true, however, when one takes into consideration the fact that the resources required to produce various goods and services are limited in quantities, and therefore, in order to get more of one thing now one must usually give up some amounts of other things.

Perhaps the word "need" should not be used in such discussions. Rarely, if ever, is there a situation such that one could not survive unless he had more of a particular thing. Instead, the problem might be viewed as one of cataloguing the various things that could be produced—given the available resources and ways of converting them into product—and attaching values to each possibility so that one can be compared with another. Some of the problems involved in making such comparisons with reference to the problem of providing highway services are discussed in this paper. In particular, it is noted the kind of information that is required and some of the implications are indicated for highway research.

Reference has been made to the problem of determining how much to produce of highway service, or schools, or anything else, as one of evaluating all the possible bundles of things that might be made available. This paper will not pursue this approach directly. Perhaps in a controlled economy this procedure is employed. In the economy of the United States it might be done in evaluating various kinds of defense programs. But to construct a complete catalogue of what might be produced would be virtually impossible, and to value each collection in accordance with generally accepted evaluation procedures—if such exist—also would be very costly. Instead, one can employ a procedure making use of certain conditions that would be fulfilled in order for a collection to be an optimal one (that is, a "best" one). In particular use can be made of the market system in obtaining information about how a change in the collection of things that might be produced will be evaluated by the population.

Unless the economy is organized inefficiently (involuntary unemployment is one kind of inefficiency) it costs something to expand the output of a particular good or service. Under certain conditions this cost represents the value of other goods and services that must be sacrificed in order to obtain more of the particular commodity in question. Let the price that people are willing to pay per unit of the good represent its value. If price exceeds the additional cost per unit, more of that good and less of the others would constitute an improvement, since the value of more of the good would exceed the value of less of other goods. Conversely, if the price of the commodity is less than the additional cost, more of the commodity and less of the others would make things worse. Comparisons of prices and costs can tell which things should be produced in greater quantities and which in smaller ones. One might then say, "We need more of something if its price exceeds its cost and less of something else if its price is less than its cost."

For comparisons of prices and costs to give one a true picture about his needs, the prices must give good approximations as to what things are worth, and the costs must yield accurate estimates of what must be sacrificed. Some things one would not consider selling, and for them a meaningful price cannot be established. For other things, the price underestimates the true value. The price that one is willing to pay for something that he will use represents only the value to him of consuming the particular good and excludes the value to other people of his use of that good. Elementary education is frequently cited as a case of a service that would be produced in insufficient amounts if one followed the price-cost comparison because he is willing to pay something for

children's education, but the price you are willing to pay doesn't depend on my feelings about your children's education. For still other things, the price overestimates the value because one person's welfare is influenced adversely (other than by what happens to prices) by increased consumption of the good by another person. Thus, fuels that contribute to air pollution may be over-priced (or under-costed). Users wouldn't be willing to pay as much for them if they had to bear pollution costs.

Costs also may be poor representations of what has to be sacrificed because they include monopoly elements or the results of restrictions—including taxes—imposed by government. However, imagine that such things don't exist or that they can be accounted for properly. Then, for a commodity whose consumption by one person has no effect on another's person's welfare—except through its impact on price—one can usefully talk about whether too little or too much of it is being produced with reference to the relationship between its price and its cost.

What does all of this have to do with highways? One will contend that, for the most part, highway services are such that if they were priced and if costs were computed appropriately, one would be supplying his "needs" when one produced that amount such that the price—the amount charged for a passage by a particular vehicle—equals the cost resulting from that passage.

First, it should be made clear that the benefits from investment in highways have properties such that a highway investment can be evaluated in the same manner as can any investment designed to produce goods and services that are to be sold. To speak of highway services as if they constituted a single homogeneous commodity is to error in the same way as to speak of food as a single good. Discussion will be avoided of how such service should be defined except to assert that some of the difficulties in analyzing highway problems arise from inappropriate definitions of highway service. Traveling a particular distance, at a given speed and with given comfort and safety may be as different—in the mind of the highway user—from traveling this same distance at another speed and with other degrees of comfort and safety as a pound of sirloin steak is from a pound of potatoes. Truck travel differs from auto travel, etc.

Although there are many different kinds of highway services, nearly all of them benefit the highway user—in the case of services provided by passenger car travel—or the benefits are passed on to other persons from whom a collection can be made—through commodity prices, in the case of truck services—in the same way as are the benefits from technological improvement or additional capital used in a farm or factory. In general, highway services are like food in that one person has no interest in another's consumption pattern (except for its effect on prices)¹. The case for distributing highway services and for determining their appropriate levels of output by a price-cost mechanism is as strong as that for any other commodity group.

The statement that highway services comprise a commodity group such that price-cost criteria should guide their distribution and production does not mean that one should set up toll stations at every street corner and every cross road. Because of collection costs and inconveniences that might be more distasteful than congestion, toll roads can play a very limited role in the highway system. However, one can establish motor fuel taxes, weight-distance taxes, license fees, and other charges in a way such that the over-all fee schedule yields a rational allocation of whatever road and street facilities are available. And, one can account for costs and revenues so that he will get about the right amount of highway investment and distribute it fairly well geographically. In fact, the structure of charges to highway users already may be fairly reasonable and is constantly improving, although one is without some information required to construct

¹ That different degrees of highway congestion are not all equally satisfactory to a highway user might appear to destroy the assertion that one man's consumption is of no concern to other men, and vice versa. However, if one considers travel at one speed, safety, etc., as a different commodity from travel at another speed, safety, etc., there is no contradiction in the formal statement. More congestion is analogous to the higher price for steak that would result from an increase in its demand. The highway user would be indifferent to some higher fee with lower congestion and the low fee with more congestion.

a good fee catalogue. The provision of facilities probably is less rational, relatively speaking, than is the fee schedule, although only rough guesses can be made about this from existing data.

Except on toll roads, the basic charge for the passenger auto should be, and is, the motor fuels tax. Fuel consumption is an index of distance traveled for any vehicle, although distance traveled and amount of service are not uniquely related as long as highways differ. However, to account for highway quality difference by differences in fuels taxes probably is not feasible. Since passage for the passenger auto is the least costly to provide the fuel tax can be used as a kind of toll. Special fees for passenger cars may be warranted in large cities where congestion is a problem, such fees being in accordance with the higher costs of providing a given level of service in areas where land values are high. Similarly, special assessments or special license fees for residents of very sparsely settled areas may be advisable. In this case, such fees are in accordance with the high value of the service rendered by the highway.

For trucks and busses, fuels taxes are supplemented by license fees in recognition of differences in costs imposed by passage of vehicles of different characteristics. However, license fees cannot be varied sufficiently to equitably tax the many different classes of weight and distance combinations. Weight-distance taxes are preferable and could permit different fees for different routes. In fact, weight-distance taxes might be administered in a manner similar to that used in collecting the personal income tax from self-employed persons.

Some of the implications of using price-cost comparisons to a greater extent in making highway decisions are of interest.

If prices and costs are appropriately determined, not only the highway system as a whole, but each separate entity should "pay for itself" in an accounting sense when the system is optimal (because of indivisibilities, equality between imputed revenues and imputed costs may not be achievable). Otherwise sectors of the system that are "making a profit" and ought to be expanded may be supporting sectors that ought to be contracted. This possibility cannot be detected when only the revenues and costs of the system as a whole are examined.

That highway users should pay for the highways has much, though not universal, support. However, that each clearly distinguishable sector should pay for itself is less widely supported—except possibly for toll roads. In particular, it is believed that generally there has been relative over-construction of rural non-trunk highways, although this belief can neither be adequately supported nor refuted with existing data.

The prices that have to be paid for resources are taken as reliable estimates of the value of the product that has to be sacrificed in order to expand production of one good. Government pays the same prices for labor and materials as do other users. However, it borrows money at more favorable terms (at a lower rate of interest) than does the typical private borrower. This lower interest rate reflects primarily the confidence of the lender in government's ability to repay—not in the relative merits of the projects. Government can tax (or print money, if it is the federal government) to repay loans. Private borrowers must repay out of earnings. If government borrows at, say, 3 per cent, whereas private producers borrow at, say, 6 per cent, and both government and private producers use amounts of capital such that rates of return are equal to borrowing costs, government will be using too much and private producers too little. Shifting capital from the government to the private sector would expand total product. Government also should not invest in projects unless they would yield, say, 6 per cent, if capital is to be allocated in the best manner. Thus, decisions to build highways and to make other governmental investments should not be based on the rate at which government can borrow but on the rate of return on capital in other uses.

Tax differentials, as well as differentials in costs of borrowing affect the relative prices of governmentally produced goods in comparison with privately produced goods. In the transportation field are special excise taxes affecting some kinds of transport (but not others) that encourage use of the highway system rather than alternative forms of transportation. These taxes ought to be abolished. However, there are also property taxes applying to nearly all private property. A complete evaluation of the property tax is not considered to be appropriate for this discussion. However, to obtain a better

distribution of resources among various kinds of transportation, imputed property taxes on highways ought to be considered in arriving at highway costs, just as a "shadow" interest rate equal to the marginal rate of return on capital in private investment rather than the cost of borrowing ought to be employed.

To try to make the last two points clearer, imagine that there are two services—call them "rail transport" and "highway transport"—both of which could be produced at the same constant unit costs, if resource prices were the same to both industries. Assume also that the amount of either service demanded varies inversely with its price and directly with the price of the competing service. With the same interest charges and no taxes, the prices would be identical and certain amounts of each service would be produced. However, if one industry were charged more for capital than was the other and also had to pay taxes proportionate to the volume of service produced, its service would be priced higher than that of the other industry. Less of it and more of the other would be used than would be economic, that is, than would be the case if "true" costs determined prices.

It should be noted that if the highways were to "pay for themselves" in the sense of yielding revenues equal to costs, including the imputed ones, there would be diversion of highway revenues to the general governmental fund. This diversion would be equal to imputed property taxes plus, say, 2 or 3 percent of capital outlays—this 2 or 3 percent being a rough estimate of the differences in borrowing costs to government and private borrowers.

Although it is not economically feasible to collect tolls except on a very small percentage of the highway system, tolls can be equitable rationing devices and can permit accurate accounting of the revenues attributable to a particular sector of the highway system. For these reasons, rather than minimizing the number of toll roads, one would employ them wherever feasible. However, certain practices in administering toll roads are not consistent with best use of the highway system. In particular (a) requiring that toll roads pay for themselves out of tolls is uneconomic. Motor fuels tax receipts also should be credited the toll roads. To do otherwise will result in under-utilization of such roads and over-utilization of or over-investment in, freeways, (b) tolls should be much more flexible than toll authorities have been inclined to make them in the past. Varying tolls with the demand would smooth the traffic flow and could make it approximate more closely that for which the road was designed. Ideally, tolls might fluctuate as do the odds at pari mutual betting booths or as do stock market quotations. In areas such as Manhattan where access is by tunnel or bridge, tolls to the island certainly should exceed those away from the island during the morning rush hours, and perhaps vice versa during the evening hours—although if there are too many autos in Manhattan there is no reason why entry fees should not always exceed exit fees.

Fluctuations in tolls not only would aid in controlling traffic flows. They also would permit improved estimates of the demand for highway services. Such data are required for determining how much investment to make in highway facilities and very few of them are available.

To minimize errors in locating and investing in highway facilities, the demand for and costs of providing various services must be known. Highway facilities provide services over a long period of time, and no one can forecast with perfect accuracy, the conditions that will prevail in the future. However, one could make use of more of the attainable cost and demand information than has been made available.

First consider costs. Economists divide the elements determining costs into two classes: (a) The technological and (b) the market. The first class consists of a description in purely physical terms as to how resources can be converted into product. How to construct a flexible pavement and a concrete pavement that would carry certain loads with a given deterioration for a given period of time would be part of such a description. The market describes the prices that have to be paid for resources. If there is more than one way to do a given job, the way that is least costly at one set of prices obviously will not be the least expensive at every other set of prices.

A great deal of technological information about highways is available and more is being assembled. However, it is believed that some of this information is not in a form such that it permits relevant cost comparisons, that is, comparisons of the cost of

carrying one type of vehicle rather than another. To appropriately assess the maintenance cost attributable to the passage of a vehicle with particular characteristics over a given section of the highway, the wear and tear on the road has to be measured in terms that can be converted into costs. The cost of restoring the road section to its condition prior to the vehicle passage is the required information, and no way can be seen of converting fatigue data into the desired informational form. Comparisons of construction costs and attempts to allocate them are numerous. However, it is maintenance plus construction costs that are relevant, and more maintenance but less construction becomes economic as interest rates are increased.

With reference to the demand for highway services much less is known than about costs. Ideally one wants to know how much of a particular kind of service buyers are willing to take at particular prices. From this one can determine, for example, how much people believe it is worth to be able to travel with a given degree of safety at 50 mph between two points rather than at 40 mph. If the additional cost of providing facilities for the higher speed was less than the value, these facilities should be constructed.

As was stated previously, varying tolls permits obtaining demand information. Perhaps arrangements could be made with selected toll road authorities so that the effects of various tolls on the traffic pattern could be observed.

Another method for obtaining demand information is through asking users how they would behave if certain conditions prevailed. Drivers might be asked how much more they would be willing to pay per trip if the traffic density were such that they could drive at one speed rather than another, for example. Such surveys typically permit presenting a wider choice of possibilities than could be presented in an experiment such as varying the tolls on a particular road. However, the possibilities are hypothetical ones and the responses may differ considerably from actual behavior under the circumstances. Nevertheless, such surveys have yielded information useful to business firms trying to estimate the demand for a new product and could be used in estimating more accurately highway users' preferences.

To determine whether a particular sector of the highway system is "paying its way" one needs to know its traffic pattern. Many traffic counts have been made and one can tell a good deal about traffic patterns from the wear and tear on a particular highway. However, much less is known about the composition of traffic on various sections of the system than one should know.

SUMMARY

In this short discussion, it has been asserted that highways compete with other activities, including other transportation facilities, for the use of resources. In determining the amount of highway services to provide, one should compare the value of these services with the other things that could be provided. Highway services are such that comparisons of their prices—if they could be priced—and their costs—if resources are obtained for providing such service under the same terms as in other uses—could tell whether too much or too little is being produced.

Employing tolls to sell highway services directly is economic only on a rather small part of the highway system. For the remainder, the schedule of fees acts as a schedule of prices. The price to any vehicle ideally should be the cost incurred in handling that vehicle. To put highway services on the same footing as other competitors for resources, costs should be estimated using the same interest rates and such other cost factors as property taxes as these other users pay. Thus, some diversion of highway revenues to the general fund would be justified.

To make this price system function effectively research is needed that will provide estimates of the demands for highway services, and to know more about costs is needed. Toll road experience can provide some information about demand, and tolls might be varied specifically for this purpose. Market surveys also could be employed.