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THE TREATMENT OF CAPITAL COSTS OF VEHICLES IN EVALUATING ROAD SCHEMES

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ABSTRACT

There are two ways in which new road schemes may influence capital expenditure on vehicles. Firstly, by improving utilisation of existing vehicles, the size of fleet needed to perform a given volume of work may be reduced. This will clearly reduce the amount of capital tied up in motor vehicles at any point in time, and to the extent that vehicle life is determined by age rather than mileage run, will also yield savings in terms of investment in new vehicles. Secondly, by generating additional road traffic, road schemes may lead to an increase in the stock of vehicles in use.

This paper argues that the current treatment of vehicle depreciation and interest charges in U.K. cost data fails to allow correctly for either of these items. Errors of logic occur in the way in which the capital stock of vehicles is valued, and in the fact that certain overheads are ignored even when fleet size changes. Moreover, the empirical evidence supporting the current partitioning of depreciation into overhead and running cost components, and the assumption of constant hours in service after an increase in journey speed seems of doubtful validity.

An alternative method of calculating vehicle capital costs, based on the concept of annual capital charge, and making explicit the assumptions with respect to vehicle utilisation, is advocated, and the sensitivity of results to the view taken of the latter is demonstrated by means of specimen calculations.

Introduction

Expenditure on new road vehicles in Great Britain in 1972 totalled £1,171 m ($2,700 m). Expenditure on road construction and improvement for the same year was £538 m. ($1,240 m). Yet whilst much is written on the efficient allocation of resources for road building, investment in new vehicles receives scant attention in the transport economics literature. No doubt this is because decision-taking in this area is very disaggregated, involving literally millions of separate agents. But this does not mean that decisions are not subject to government influence. On the contrary, changes in sales taxes – which influence the relative levels of capital and repair cost – and in vehicle testing legislation are likely to have
played a major role, for instance, in reducing the average life of vehicles in the last ten years.

Another important factor may have been rising annual vehicle mileages. Average annual mileage run by cars rose from 7,800 (12,500 km) to 8,900 (14,250 km) and by good vehicles from 12,700 to 14,800 miles (20,300 to 23,700 km) over the period 1962–72 (Highway Statistics, 1972). Whilst such low figures clearly imply that the utilisation of most vehicles is still poor, improvements to the road network may well have contributed to this upward trend. Similarly, if road improvements lead to changes of mode for either passenger or freight traffic, they may lead to increased net investment in road vehicles. Such effects are important in measuring the benefits of transport plans and projects in two contexts; first, in estimating the cost savings to existing traffic as a result of the scheme; and secondly in evaluating the benefits to generated traffic, since these are measured as the “willingness-to-pay” of the user less the costs involved. But little investigation has taken place of these factors and current procedures involve implicit assumptions based on doubtful empirical justification, which are in part logically inconsistent.

In the first context, it may be argued that if journey time savings enable the same volume of work to be performed with a smaller vehicle fleet, there will be cost savings not only in terms of operating overheads, but also in terms of the capital costs of vehicles. If higher speeds enable more miles to be run during the life of a vehicle, then depreciation cost per mile will be reduced. But even if the mileage run during the life of a vehicle remains constant, so that any increase in the annual mileage run is exactly counterbalanced by a shortening of vehicle life in years, there is still a reduction in the amount of capital tied up in the fleet, with a consequent saving in terms of interest costs. This was the attitude taken in the pioneering study of the M1 motorway, (Coburn, Beesley and Reynolds, 1960), where the number of vehicles “saved” was estimated by means of assumed utilisation factors, and the resulting interest charges saved were (wrongly) calculated as the rate of interest (taken as 15% per annum) multiplied by the value of the saved vehicles as new less any scrap value.

However, it is in the second context, that of generated traffic, that the treatment of vehicle capital costs is quantitatively more important. Suppose that the demand curve for journeys over a particular route is as shown in Figure 1. A road scheme which reduces the cost per journey from $C_1$ to $C_2$ will lead to generated traffic $(D_2 - D_1)$, the benefits to which are measured by the usual triangle of consumers’ surplus (shaded). However, the treatment of capital costs for the generated traffic will affect the value of $C_2$, and hence — in this formulation — the estimated