Changes in the Cost of Motoring and Implications for the Public Transport Sector

Dr Graham Parkhurst[1]
Faculty of the Built Environment, University of the West of England, Bristol

Introduction

Motoring costs are considered in terms of their structure - how the different components are paid, and how changes can influence demand. Costs are also considered in terms of how they are allocated between travellers and society. Recent historical changes are examined, with the finding that motoring costs are not particularly high in historic terms, but are set to fall unless there is government intervention to prevent this happening. It is concluded that road pricing emerges as a key consideration in the future of public transport pricing, which could stimulate additional demand, but the adoption of road pricing will also create challenges for the sector.

Nature of costs

Transport costs can be considered in terms of the structure of costs paid by the traveller. In the case of motoring costs, the fixed costs of car ownership and variable costs of use are important. Although cars can be sold as well as bought, whilst an individual owns one then the marginal costs of using it tend to be low, or at least are perceived to be low. Demand for public transport will be elastic with respect to all of the motoring costs to varying extent. The most studied variable is that of elasticity with respect to car fuel price.

Goodwin (1992) notes an overall average of +.34 from five empirical studies, mainly considering urban rail transit. This indicates that each 1 percent increase in fuel price results in a one-third percent increase in public transport use. However, five studies are few on which to base general theory. The average is also based on a wide range of +0.08 to +0.8, and this is to be expected as the relationship will vary according to the public transport mode and service localities. The nature of the change can also be important, with large price changes not necessarily sharing the same mathematical relationship as small changes.

Given the limited number of empirical studies, some researchers have sought to derive estimates of cross-elasticities between modes from empirical knowledge about the elasticity of demand for those particular modes themselves. Work by Acutt & Dodgson (1996) shows a lower overall level of cross-elasticity but with a similarly wide range from +0.01 to +0.1. Hence, it is suggesting that motorists are more price insensitive and car dependent than the earlier studies. These calculations are, though, a further step removed from empirical observation. Professor Mackett has some more up-to-date data based on observations in the following presentation which are more encouraging from the perspective of the public transport operator.

[1] graham.parkhurst@uwe.ac.uk; +44 117 32 82133

Although changes in user costs are an important consideration of this conference, motoring costs can also be considered more widely, in terms of the overall cost of a journey to society. For any such journey, private costs will be created, which are paid variously by the traveller or the transport operator. Those costs which are not met by the user or the operator are external costs, which are ultimately paid by society, through the effects of congestion and pollution. The externalities of car use per passenger-kilometre have historically been observed to be higher than for public transport journeys; the only significant exception here has been the finding that the pollution from large diesel engines is disproportionately responsible for negative effects on health. The gap has been seen as widening by some in recent years, due to the greater importance being placed on the external costs of congestion. I'll return to this point at the end.

Recent changes in Surface Transport User Costs

Of the relevant trends, motoring costs show the greatest stability over recent years, with the overall cost being around the same as in 1980 terms. In contrast, the biggest change in trends has been a 90% increase in disposable income. Real-terms fares increases for public transport since 1980 are 33 percent for bus and coach and 38 percent for rail.

Looking at the last decade only, motoring costs have risen more obviously. This is the result of increases in the variable costs, particularly the introduction of the fuel duty escalator, but also due to the rising cost of insurance policies. In contrast, the main fixed cost of vehicle purchase price has fallen due to competition as a result of European Commission intervention, over-capacity in the EU market and competitive production from the Far East.

Taken together, these changes suggest that car ownership has become much more affordable for a large share of the population, whilst a certain amount of car traffic has been avoided in recent years by the increases in fuel duty.

Glaister & Graham (2000) found the elasticity of car traffic with respect to income to range between +1.1 to +1.8 in the long-run, so that a 1 percent rise in income could lead to an increase in traffic nearly twice as large. This is a major part in explaining increased car use, which has in part resulted from the spread of car ownership to new households.

Notably, bus and rail fares have risen faster than motoring costs, but more slowly than incomes. This in part explains how public transport use has risen in locations in which public transport is favoured, such as bus use in the historic towns and rail for commuting into central London.

Glaister & Graham's review suggests that the elasticity of fuel consumption with respect to price is modest, but increases over time from -0.15 to -0.3. However, due to background economic growth, income growth, and car ownership growth we would not necessarily expect to see any actual reduction in traffic as a result of the fuel escalator. Notably, though, UK road traffic grew by 19 percent in the six years, before 1993 the escalator was introduced, and by 13 percent in the six years after.

Future Motoring Costs

The cost of motoring influences public transport demand, and so pricing, directly, through the cross-elasticity relationship. Motoring costs also influence public transport indirectly, as rising road traffic increases the operating costs and reduces the operating efficiency of bus services.

The main influences on motoring costs and the affordability of motoring in the future are:

- Economic growth
- World oil prices
- Vehicle market and technologies
- Taxation policy

The traffic forecasts in the Ten-year Plan (TYP) followed Treasury advice that assumed UK economic growth would be 2.5 percent per annum between 2000 and 2005, and 2.25 percent per annum between 2005 and 2010. Despite some underperformance in recent years, government is now more optimistic about growth through the decade. This can be expected to increase demand for transport in general, and car use in particular, possibly above the TYP forecast of around 17 percent between 2000 and 2010.

Oil prices are a large uncertainty in forecasting. The authors of the TYP followed the DTI view that the long-run crude oil price lay between $14 and $18 per barrel at 1999 prices, and assumed that oil prices would reduce to $16 in 2010. However, the OPEC target price is to maintain prices in the $20-$25 range. The price in the last four years has been considerably above that range, recently rising above $40 per barrel. It is not clear to what extent increased demand from countries such as China was considered in the DTI forecasts. Some commentators see an upwards trend from now on, rather than a return to the experience of the 1990s, as the peak in commercially-viable world oil production will be reached around the turn of the next decade (Campbell, 1996).

The future vehicle market also has a number of uncertainties. New technologies may be more expensive, but market forces will work against increases in new vehicle prices. Even if this fixed component does rise, the car manufacturers selling vehicles in the EU have agreed that new vehicles should produce 25% less CO_2 emissions per kilometre, on average, by 2008. In the longer term a target for a 35% decrease may be agreed.

Government taxation policy has the potential to avoid car use becoming more affordable. However, recent changes in fuel duty as a result of protests have actually reduced the level of taxation on fuel. Government has also made commitments to revenue neutrality for new motoring charges. Whilst this is politically understandable it is arguably inappropriate given that incomes are rising and motoring costs actually falling in real terms. The experience from other economic sectors is that new taxes are often introduced in a cautious way if they are revenue neutral. This happens in part because of uncertainties about how the tax will work in practice. However, the result is that taxation may initially fall.

Environmental Performance of Public Transport

Buses and trains have generally been correctly regarded as environmentally friendly modes, where they are reasonably well patronised. However, the pollution external costs of car use have been falling fast in recent years, following EU legislation. The typical new bus now produces considerably more nitrogen oxides per passenger-km than the typical new car. Concerns have been raised more recently that a focus on very high-speed inter-city rail (350km/h) could lead to higher levels of climate change gas emissions per passenger-km than would be achieved in an efficient car, or even an aeroplane, depending on relative vehicle occupancy (Kemp, 2004).

If road pricing is introduced it can be assumed that it will restrain traffic to some extent, but the main effect would be to spread-out traffic, so reducing congestion. As pollution reduces, congestion becomes an increasingly important component of the external costs of car use. If the introduction of road pricing is not accompanied with both

- an improvement of the environmental performance of public transport and
- modal shift to public transport

there is a risk that detractors will seek to claim that it is less environmentally friendly than car use.

Conclusions

There is a reasonable understanding about how changes in motoring costs influence public transport use, although particular circumstances may vary from the studied examples, and trends can be hard to separate from each other.

The increase in national wealth combined with a reduction in motoring costs would seem to imply increased demand for all modes of transport combined with a reduced modal share for public transport. This suggests that, in order to retain modal share, public transport prices will need to fall at times and places where it cannot compete with the private car on journey time, accessibility, or overall journey costs (*e.g.*, including car parking costs). The reductions in fares might need to be funded by greater subsidies, possibly to be financed by hypothecation from road tolls.

Road pricing would also be a logical response to rising road congestion – seen by many as the most important contribution to the external costs of transport – and mainly caused by private motor cars. However, other external costs include climate change emissions and air pollution. Although the performance of public transport against these criteria has tended to be strong until now, the technological enhancements in private car performance mean that the benefits of public transport per passenger-km are less clear than they were.

The introduction of road pricing can be expected to reduce further the relative contribution of car use to the external costs of transport. The public transport industry needs to be aware that the introduction of road pricing could lead to a negative publicity feedback effect. It is essential that more rapid progress towards improving the environmental performance of public transport is made to avoid partially-founded

accusations that private car use has become the most environmentally-friendly mode, which could undermine political and fiscal support for the industry.

References

Acutt, M.Z., Dodgson, J.S., (1996). Cross-elasticities of demand for travel. *Transport Policy*, **2** (4), 271-277.

Campbell, C.J. (1996). *The Twenty First Century - The World's Endowment of Conventional Oil and its Depletion*. http://www.oilcrisis.com/campbell/cen21.htm

Department for the Environment Transport and the Regions, (1999). *The Environmental Impact of Road Vehicles in Use - Air Quality, Climate Change and Noise Pollution*. The Stationary Office, London.

Department for Transport, (2004). *Transport Trends*. DfT website edition, updated April 2004.

Department for Transport, (2004). *Transport Statistics Great Britain: 2003 Edition*. The Stationary Office, London.

Glaister, S., Graham, D., (2000). *The Effect of Fuel Prices of Motorists*. AA Motoring Policy Unit and the United Kingdom Petroleum Industry Association, Basingstoke.

Goodwin, P.B., (1992). *A review of new demand elasticities with special reference to short and long run effects of price changes*. *Journal of Transport Economics and Policy*, **26** (2), 155-163.

Kemp, R., (2004). *Environmental Impact of High-speed Rail*. Paper to High Speed Rail Developments, Institution of Mechanical Engineers 21 April 2004.

Maddison, D., et al. (1996). *Blueprint 5: The True Costs of Road Transport*. Earthscan.

Sansom, T., Nash, C., Mackie, P., Shires, J., Watkiss, P., (2001). *Surface Transport Costs and Charges Great Britain 1998*. Report to Department of Transport. ITS, Leeds University.