

9 EQUITY

9.1 INTRODUCTION

This chapter addresses the theme of equity impacts for cities considering or planning the implementation of a road pricing scheme.

9.2 WHAT IS THE IMPORTANCE OF THE THEME?

While definitions of equity vary, they all involve defining groups of potential winners and losers from congestion charging (Langmyhr, 1997). The two principal dimensions are vertical and horizontal equity. The vertical dimension concerns the distribution of impacts by income and socio-economic characteristics. The horizontal dimension also referred to as spatial or territorial equity, concerns the impact on people living in different areas or making differing types of journey. While there are also issues of equity between firms, these are covered under economic impacts. Treatment of equity impacts therefore focuses on differences between individuals.

Road pricing will change the costs of travel by car and by competing modes. These will differ by type and location of journey. Vertical equity impacts are, as a result, complex. Lower income car users in the charged area will be adversely affected, but lower income residents are more likely to use buses, which will benefit, and walk and cycle. Horizontal equity impacts depend on the location and nature of charges. With a charge to cross a cordon, differences are marked, with those making short journeys across the cordon experiencing the greatest proportional cost increase, and those within the cordon benefiting from reduced congestion and a better environment. With multiple cordons or distance-based charges, the differences are less acute, but more complex. There is also a set of horizontal equity considerations which concern the nature of the user or journey. Disabled drivers are an obvious category of concern. So, to a lesser extent, are those travelling when public transport is less available and those carrying bulky loads.

All of these types of potential inequity can potentially be tempered by the use of exemptions and rebates, by provision of alternatives, or by reallocating road pricing revenues in other ways.

Concern over inequity was frequently cited as one of the main reasons for rejecting many early road pricing proposals. More recently they appear to have been less frequently mentioned. This is reflected in the results of the User Needs Assessment Questionnaire, in which our 21 city users ranked this topic sixth out of nine in terms of importance to them. Despite this, it has been agreed to include this as a theme for review within CURACAO.

9.3 WHAT IS KNOWN ABOUT THE THEME?

9.3.1 What are some of the Vertical Equity Arguments?

The majority of this section is taken from May and Sumalee (2003) with some updating of literature on the London Congestion Charging Scheme.

As outlined by Hau(1992) the fundamental problem with congestion charging is that three groups of people are made worse off by the charge. Those who are tolled are made worse off because they face a higher price, those who are “tolled off” because they wish to avoid paying the toll, and even those who are “untolled” because they are using routes that are not affected by the toll can be made worse off because diversion of the tolled off may lead to congestion. He argues that these three groups of people are the reasons why there is a lot of scepticism regarding road user charging.

Early attempts in dealing with the equity issue mainly involved analysing the impact of road pricing on vertical equity (see Anderson and Mohring, 1995; Fridstrom *et al.*, 2000; Giuliano, 1994; Gomez-Ibanez, 1992; Langmyhr, 1997). There are several conflicting arguments regarding road pricing in the literature (AECOM, 2006).

Firstly it is likely that the wealthy experience greater costs than the poor; since wealthy people are more likely to drive cars than the poor, they pay more under road pricing. However, one could also equally and validly argue that the poor experience greater costs than the wealthy; since the toll is a flat rate tax, a disproportionate share of their income is required to pay road pricing fees. This technically makes the flat road pricing charge “regressive”. In addition, the poor are less able to alter their driving times to avoid peak period travel to incur the highest charges. A general conclusion from various studies is that low-income car users or less-flexible car users (e.g. based on gender or flexibility of working schedule) are likely to be the worst-off groups as a result of road pricing.

In addition, it is possible to argue that the wealthy experience greater benefits than the poor since by definition, the wealthy possess a higher value of time and will be less likely to be “tolled off”. Equally valid though is the counter-argument that the poor experience greater benefits than the wealthy because the poor are more likely to use public transport and therefore less affected by the cost of road pricing; moreover where lower income users are more likely to use bus services than drive, they may be better off (May, 1975).

The way the revenues are distributed has a significant impact on the equity issue. Returning to Hau’s argument regarding the winners and losers of road pricing, Hau recognises that one important actor, the government gains. The gain of the government has to be redistributed back to society. If revenues are not redistributed in any way, road pricing generally results in gains for higher-income groups and losses for lower-income groups (Else, 1986; Cohen, 1987).

9.3.2 What are some of the Horizontal Equity Arguments?

Some research has looked at the horizontal dimension of equity. Fridstrøm *et al* (2000) analysed the spatial impact of road pricing cordons using spatial accessibility for each zone segregated by modes as the indicator. They suggested that the main adverse impact of a charging cordon is its boundary effect which also depends on the actual design of the scheme. A small cordon would affect residents inside the cordon most whereas those outside the cordon are the main victims of a wider cordon scheme. In the study of the Singapore ALS, Holland and Watson (1978) indicated that the cordon gave more advantage to the commercial firms outside the cordon. This problem may be reduced by the introduction of time-based, distance-based, or delay-based regimes (Jones, 2002). Halden (2003) also used the accessibility ratio between car and non-car users from different zones for different purposes. The results showed a great diversity of impacts on different areas in the city and classes of users.

Recent research has been looking at the approach to including equity aspects in the design of road pricing systems. Mayeres and Proost (2001) proposed a weighted welfare indicator giving more weight to the benefit/cost incurred by less advantaged groups. The test results showed that road pricing is an important element of the tax reform even when there is a greater emphasis on equity. Meng and Yang (2002) developed a framework for calculating the optimal road toll (to maximise social welfare) with constraints on the spatial equity impact. Sumalee (2003) proposed an analytical method to identify the optimal location for a charging cordon with spatial equity constraints. The results for Edinburgh are shown in Sumalee *et al* (2005). Jones (2002) proposed a simple approach to address equity concerns through scheme design, exemptions, and discounts.

9.3.3 What is being considered on Equity in real world schemes?

The recent report (Atkins, 2006), published on behalf of the Commission for Integrated Transport in the UK, lists a number of global cities for which the concept of road pricing has been considered alongside other demand management policies. The issue of equity does not appear to be well documented among many cities within the report.

In Auckland, New Zealand, a feasibility study (Auckland Road Pricing Evaluation Study) has been undertaken to look at road pricing, parking levies and strategic network tolling (MOTNZ, 2006).

Among the five options under consideration, the report considers that an area or double cordon scheme results in the most beneficial impacts. Further work looking at a number of semi-related equity issues is expected to concentrate on coverage of any scheme, charging period, application to vehicle types, exemptions and discounts and application of different technologies.

Whilst not definitive, there are plans to introduce complementary pricing measures in Shanghai China and move away from a “predict and provide” policy. A recent investigation recognising data sparsity performed a qualitative analysis (Ma *et al*, 2005) of an Electronic Road Pricing Proposal and concluded that there was limited equity implications provided the revenues were ploughed back into public transport.

In the Netherlands, whilst there is no finalised plan to introduce Road Pricing, there is to be a discussion of introducing distance-based road pricing by the year 2012. The financial burden there is to shift from owning a car to running a car. Cleaner vehicles will be cheaper to run than those that are more polluting. Public acceptability has been researched and over 50% support the scheme if it is considered equitable (Atkins, 2006). However, no further information appears to be available in terms of how to look at scheme design in order to reduce inequality.

9.3.4 Edinburgh Case Study

EC DG-TREN project, REVENUE, sought to understand current practices of transport revenue usage for a selected number of urban case study cities (Oslo, Warsaw and Edinburgh). Case study work conducted in Edinburgh looked at both the economic case and cross-boundary acceptability issues for the proposed scheme.

The scheme proposed before the Public Inquiry was a two cordon scheme, including one inside the ring road, and one outside of the historic city centre. It was also suggested that Edinburgh residents residing outside of the outer cordon be exempt from the charge. This matter was of considerable concern to the residents of neighbouring authorities, who would not be exempt from the charge and hence there was a degree of concern over whether all residents would be receiving “fair” treatment. (Saunders, 2005) A range of public transport improvements had been promised before charging was due to commence, however the service improvements were not planned significantly enough before the start date of charging, hence no real benefit from the improvements was experienced prior to charging. Bus service improvements were defined late in the planning process, and should have been planned in greater depth sooner in order to demonstrate the degree to which all communities would benefit. The main view of Edinburgh’s neighbouring authorities was, therefore, one opposed to the concept of road pricing as had been placed before the Public Inquiry.

Three of the neighbouring authorities opposed the charge on the basis that the plans were not seen to be equitable. Plans for revenue hypothecation were viewed as unfair to non-city residents who would have been expected to pay the charge, yet not receive any direct benefit. The neighbouring authorities had no legal grounds on which to secure any of the public transport improvements they needed the scheme to support. The scheme was contested on the premise that city residents would receive huge exemptions but would be the main benefactors. City residents would also have benefited disproportionately more from the public transport improvements. The issue of the exemption given to outer city residents of Edinburgh was a critical acceptability problem, controversial in terms of the specific outer cordon exemptions.

A particularly important issues affecting equity/fairness, be that perceived or ex-post, is the allocation of revenues. Past research has shown that the allocation of revenues plays a key role in enhancing acceptability, mainly via fairness considerations, which may influence the distributional impacts in the desired direction. Attention has been paid mainly to the use of generated revenues.

9.3.5 Norwegian Road Pricing Experience

Considerations of road pricing and equity dealt with two main themes, how to allocate the burdens of charges and how to distribute the benefits. One important point found out is how to relax on the ambition to

design "optimal" schemes, in a way that responds to important con-arguments and reduces opposition. The following attributes were included in the toll ring:

- A "one-hour rule" whereby one would only get charged once per hour regardless of the number of crossings of the cordon made;
- Free crossings of the toll ring for disabled drivers;
- A system allowing free passage after 5:00pm and all day at the weekends. There was an equity argument here which was to avoid charging for "social travel".

An assessment of the distributive effects of road pricing must take into account how revenues are spent. Road pricing attracts much equity based opposition on the basis that high-income motorists and commercial traffic constitute the "winners" predominately. Those likely to lose out on the grounds of equity are predominately those who are low income and car-dependent families. The most commonly used solution here is to use pricing revenues to improve public transport. Trondheim's experience has been to earmark revenue not only into public transport improvements but also to walking and cycling.

Writers on equity issues find out of the proposed dichotomies suitable for analysis horizontal v vertical equity, which is believed to be too crude a measure to use to capture the complexity of equity management.

A set of principles illustrate a reduced influence after implementation. Formal equality attracted less importance in Kristiansand, where the choice of toll stations on two sides of the city was considered to be 'fair' solutions. In the city of Tromsø, responsibility was a main argument for the petrol fee alternative (you pay for the degree to which you use the roads).

One particular difficulty for the Norwegian authorities was where to locate the toll stations in a "fair" way. The 1991 ring was a compromise between fairness arguments and revenue maximisation.

Road Pricing has led to financial success for a number of cities and towards the reduction of congestion and better quality of surface public transport in cities like London and Stockholm. The improved quality of surface based public transport would be assumed to have reduced inequities from a position ex-post whereby non-car owners would have experienced lower quality public transport. There is an overall acknowledgment of a loss of cohesion as a consequence of road pricing as a congestion charging solution, in terms of those who cannot pay the charge and have experienced no further improvement in the quality and availability of alternative public transport alternatives.

Surprisingly, there appears to be little empirical research on equity impacts. The original Singapore study only looked briefly at the issue, and there is no mention of equity impacts in the recent London results.

While there remain some uncertainties over equity impacts, they mainly relate to issues of scale, which will depend on detailed design, and of design approaches which can be adopted to mitigate these impacts.

9.4 WHAT ARE THE POLICY IMPLICATIONS AND IMPLICATIONS FOR OTHER THEMES?

As noted, fears of inequity appear to be less dominant in decisions on road pricing than they once were. However, it is still probable that those opposed to road pricing will use equity concerns as a supporting argument. It therefore remains important to understand the scale of both vertical and horizontal inequities, and this will require a disaggregated analysis by person type, income level, journey type and specific person and journey characteristics.

The principal solutions to equity problems lie in the design of the scheme itself, including location, time of day and level of charge; the use of exemptions and rebates; the application of complementary policies, particularly to provide alternatives; and the use of surplus revenues to provide direct or indirect support.

In due course it may be possible to assess these issues further through additional empirical research. In the meantime research will have to rely on the results of predictive studies using disaggregate models.

It can be particularly problematic to predict the impacts on narrowly defined groups such as disabled drivers, or of special treatments such as rebates.

The User Needs Assessment Questionnaire results for CURACAO demonstrated that for equity, the achievement of this through road pricing has been given a low priority by key-decision makers. There is a demonstration here of the need to concentrate efforts on presenting and promoting road pricing as an equity driver.

There are the following implications for other themes:

- **Objectives:** While equity now appears to be of less concern, it should continue to be considered either as an objective of, or more appropriately a constraint on, road pricing schemes
- **Scheme Design:** Schemes can be designed which are less inequitable; key characteristics include location, time of day, level of charge, exemptions and rebates, complementary instruments and use of revenues; more guidance is needed on how to incorporate equity considerations into scheme design
- **Technology:** It is not clear that there is a link between technology and equity
- **Prediction:** For equity considerations, models are needed which predict the impact of road pricing on individuals, and individual journeys, disaggregated by income, location, time of day and journey purpose; ideally those models should also identify impacts on special needs, such as disabled drivers and those carrying bulky loads; where scheme design includes exemptions and rebates, models should ideally be able to assess their impacts
- **Economy:** Economic impacts can have substantial secondary impacts on equity; poorer households are more likely to have to move if residential areas become more attractive, and are more vulnerable if they become less attractive; those without good public transport access are more vulnerable if shops and facilities close or leave an area; conversely, inequities are less likely to have serious impacts on the economy, since those who are likely to be adversely affected are typically less economically active.
- **Acceptability:** Those who are, or perceive that they are, more adversely affected can be expected to find road pricing less acceptable; perceptions of inequity to others may also increase concerns over acceptability; it would be helpful to have more information on the scale of these impacts.
- **Transferability:** The transferability of equity impacts and underlying equity concerns and resulting design responses to inequities are likely to differ between cities; little is known about these impacts as yet

9.5 WHAT THE RESEARCH GAPS AND PLANS FOR FUTURE RESEARCH?

Equity issues are reasonably well understood, but more information is needed on the ways in which inequities differ by type of scheme and between cities and the ways in which they affect acceptability. Clearer guidance is also needed on ways of designing schemes to reduce inequities.

Considerations of equity are major determinants of attitudes to road pricing. Yet the concept does not appear to be widely researched, or to exist generally as an integral component of proposed and implemented schemes. Thus a greater understanding is needed of the different perceptions of fairness amongst the range of stakeholders, and how these may be incorporated into scheme design.

Evidence will continue to come from both predictive and empirical research. It would be helpful to know of other predictive analysis on equity issues, and of attempts to assess the equity implications of schemes such as those in London, Norwegian cities, Rome or Stockholm. Information on current research into equity-focused design tools would also be of interest.

There are also research gaps that need to be addressed in terms of the relationships between progressive and regressive dimensions of equity, and the relationship between equity, perceived fairness and social inclusion.