Faculty of the Built Environment

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Evidence-Base Review – Attitudes to Road Pricing

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Executive Summary

In March 2004 the Department for Transport (DfT) commissioned an evidence-base review of attitudes to road pricing. The review was required to cover attitudes of both the public and business, and include attitudinal research undertaken in other countries. It was intended that the study would summarise current evidence and understanding and in turn point to gaps in the evidence-base with recommendations for possible future research.

The review was commissioned to inform discussions of the Government's Road Pricing Feasibility Study (RPFS) that was announced in July 2003. The RPFS was established to advise the Secretary of State on practical options for the design and implementation of a new system for charging for road use in the UK.

Research literature and information were collected through two main lines of enquiry. First, a thorough search of academic and web-based literature was conducted, including the use of internet search engines, the 'Transport' bibliographic database and the CORDIS website. Second, direct contact was made with a number of electronic (international) networks of transport professionals, including the Universities Transport Study Group (UTSG) and the International Association of Travel Behaviour Research (IATBR), with specific requests for assistance in identifying further bibliographic listings and potentially relevant literature. Reference was made to recent conference proceedings (not yet in the formal literature), including the Transport for London/OECD event held in January 2004.

Consequently, the review has covered around 200 reports, papers and other articles addressing research in the UK and Europe, North America, Asia and Australasia. These are now catalogued and summarised as the Attitudes to Road Pricing Research Compendium. This report draws on the material within the Compendium to discuss a broad range of topics that impinge on the issue of attitudes to road pricing. The report identifies 9 key topic areas covering:

- the importance of trade-offs;
- informed attitudes;
- determinants of attitudes;
- disaggregating the public;
- attitude shapers;
- technologies;
- equity;
- business attitudes; and
- success and failure in the introduction of road pricing.

For each of these areas the report assesses the coverage, findings and limitations of research to date. In some areas a paucity of research is highlighted. In the light of the review findings and an assimilation of key issues, research recommendations are put forward for each area. An indication of priority for proposed research is also provided. A number of the recommendations are considered of particularly high priority.

First, perhaps the most persistent finding across a range of national cultures is that the acceptability of road pricing improves significantly when the revenues are hypothecated to the development of transport generally. However, a fundamental issue is how much drivers might be prepared to pay in order to raise sufficient revenues to bring about significant improvements in the transport system. In turn, this raises the question of the key trade-off in pricing schemes generally between effectiveness and acceptability. There appear to be significant gaps in understanding here,

particularly in the context of the potential viability of inter-urban and national schemes.

Second, much more needs to be understood about the determinants of public attitudes to road pricing. In one dimension, this includes the motivations of people to acquire knowledge about road pricing in terms of timing and circumstance. It also includes how the media and public information campaigns may shape public opinion. However, on another level it means identifying the key types of social norms that may determine public attitudes. In turn, this can enhance the potential for the design and presentation of possible road pricing schemes which maximise the number of 'winners'.

Third, several surveys in different countries and continents emphasise that considerations of equity are major determinants of attitudes to road pricing. Nevertheless, 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.

Fourth, surveys of business attitudes to road pricing represent a distinct minority compared with those for public attitudes as a whole. In particular, more representative surveys of business attitudes are required which compare organisational effects by economic sector, size and location. In addition, longitudinal studies can discover how business knowledge and attitudes may shift over time.

Fifth, although road pricing remains a relatively uncommon phenomenon world wide, and there will always be a site specific element to any scheme, there is a wide range of schemes in action which now allow analyses to be made of factors facilitating their successful implementation. Nevertheless, there are few studies which specifically compare implemented (or failed and aborted) schemes. By such means, it could be possible to construct a type of 'best practice' guide to policy making and implementation.

In total, the report highlights over 30 key issues across the nine topic areas.

Evidence Gaps and Research Needs

In the light of an extensive research review of attitudes to road pricing, the following recommendations are made concerning immediate and future research priorities for informing policy. For each recommendation, an indication of relative importance is provided. In addition, independently of importance, an indication of relative timing is offered. Thus some research could be undertaken immediately in order to maximise its value, while other research may be less time critical.

1 The importance of trade-offs

Trade-offs are an inherent element in any road pricing policy, but there are major gaps in understanding their inter-relationships with public attitudes. For example, revenue hypothecation emerges as a key factor in the acceptability of road pricing. However, a fundamental issue is how much drivers might be prepared to pay in order to raise sufficient revenues to bring about significant improvements in the transport system. In turn, this raises the question of the key trade-off in pricing schemes generally between effectiveness (such as an objective to reduce congestion) and acceptability. There appear to be significant gaps in understanding here, particularly in the context of the potential viability of inter-urban and national schemes. The key importance of understanding in particular the dynamics of the interrelationships between levels of pricing and acceptability, makes this field of research an area of high priority, with an urgent need for greater knowledge.

Priority: High; Timing: Immediate

2 Informed attitudes

The medium and methods by which people acquire and disseminate knowledge about road pricing can play an important role in shaping attitudes. Nevertheless, there is limited understanding of the dynamics of these cognitive processes, such as the influence of the media and public information campaigns. There also appear to be other significant gaps in understanding the interrelationships between knowledge and the formation of attitudes over time, such as the timing and motivations of people to acquire knowledge about road pricing (e.g. before or after scheme implementation). The timing of research in these areas is therefore particularly appropriate to enhancing the quality of the consultative and policy making phases of any planned road pricing scheme.

Priority: Medium; Timing: Following

3 Determinants of attitudes

Identifying underlying values can provide significant insights into why people hold particular attitudes with regard to road pricing. For example, research in recent years has suggested that conforming to social norms can be a more important indicator of attitudes to road pricing than socio-economic characteristics such as self-interest and income. A greater understanding of these links between underlying values and the formation of attitudes can therefore assist significantly in the design and presentation of road pricing schemes in order to maximise the number of 'winners.' An understanding of why people hold particular views on road pricing is fundamental to the whole policy debate, and therefore makes this an urgent field of research.

Priority: High; Timing: Immediate

4 Disaggregating the public

Public attitudes to road pricing can never be regarded as homogeneous. Consequently, geographical, spatial, social, and institutional differences can all represent significant

elements in shaping attitudes. For example, acceptance of road pricing tends to be higher in larger urban areas, and where levels of car ownership are lower, although the reasons for these differences are not always clear. Similarly, there appear to be gaps in understanding the attitudes to road pricing of residents of suburban and rural areas, and of contrasts in attitudes between car owners and non-car owners. Research in these fields is undoubtedly an area of need, but in its character is likely to represent more of a long term acquisition of knowledge and understanding, such as in studying the effects of scheme implementation.

Priority: Low; Timing: Following

5 Attitude shapers

A salient issue such as road pricing involves not only various levels of government, but also a wide range of interests on all sides of the debate. However, surprisingly little appears to be known about how this process actually works in practice, with few systematic analyses of the dynamics of the policy process. This is not just a point of academic interest, for a greater knowledge of the way the various elements of the process interact over time can allow everyone an opportunity to gain insights into the chief influences over policy change. For example, in the case of Britain, road pricing involves inter-governmental relationships at a number of levels, and yet little appears to be known about how these processes shape policy. Similarly, the role of leadership is of particular importance in the development of road pricing, but there is little understanding of how this works in practice. The lack of knowledge and understanding on the policy process is therefore a major research gap, which needs to be filled, at least in the medium term. This will not only inform the policy debate, but also enhance the quality of consultative and policy making processes.

Priority: Medium; Timing: Following

6 Technologies

Technological developments in recent years have apparently opened up considerable possibilities for facilitating a wide range of road pricing schemes. Nevertheless, these very advances in themselves pose fresh problems in terms of being reconciled with public and political attitudes. Put basically, if the technology does not work, or is not easily understood by the public, then the credibility of a road pricing scheme is fatally undermined. For example, in the case of the London Congestion Charge, considerable emphasis was placed on the technology working efficiently from the outset, and being understood by the public. There therefore appears to be a need for greater understanding of the links between the development and efficiency of types of road pricing and ease of public use. In addition, there are few studies which examine at length the important issue of road pricing technology and the protection of privacy. The interrelationships between public attitudes and technological developments in road pricing are therefore fields of research which must be an integral part of any concrete policy developments in this area.

Priority: Medium; Timing: Following

7 Equity

Research over several continents emphasises that a widespread perception that a road pricing scheme is operating on an equitable basis is likely to be a major determinant of its public acceptance. Nevertheless, the concept has not been widely researched, nor existed as a standard integral component of proposed and implemented schemes. However, perceptions of fairness may differ across the wide range of stakeholders, and it is particularly important to understand how these may be incorporated into scheme design in order to maximise the number of 'winners.' For example, perceptions of fairness can

encompass not only the operation of the scheme itself, but also the allocation of revenues. The high salience attached generally to equity in considerations of road pricing acceptability makes this a particularly urgent priority area for research.

Priority: High; Timing: Immediate

8 Business attitudes

Surveys of business attitudes to road pricing represent a distinct minority compared with those for public attitudes as a whole, although business is clearly one of the stakeholders most affected by these policies. Even within the surveys themselves, there is generally a tendency for their scope to be restricted in terms of the size and type of business contacted, rather than be representative of a wide range of organisations. In particular, more representative surveys of business attitudes are required which compare organisational effects by economic sector, size and location. In addition, longitudinal studies can discover how business knowledge and attitudes may shift over time. The large gaps in understanding with regard to these key stakeholders makes this a matter of a high priority need for research, which must be integrated with any concrete developments in road pricing policy.

Priority: High; Timing: Following

9 Success and failure in the introduction of road pricing

There are likely to be significant social, political and economic obstacles to the introduction of almost any road pricing scheme. However, experience in a number of countries indicates that these obstacles can be overcome, and there is a wide range of schemes in action which allows analyses to be made of factors enabling their successful implementation and the role therein of attitudes and public acceptance. Nevertheless, there are few studies which specifically compare implemented (or failed and aborted) schemes. Although there is always likely to be a site specific element to any scheme, comparative analytical studies which throw light on common elements for success would be valuable. By such means, it could be possible to construct a type of 'best practice' guide to policy making and implementation. There is an urgent need, therefore, to gain greater systematic understanding of how and why specific schemes succeed or fail. In particular, these explanations can be linked in to the area of determinants of attitudes (No. 3), concerned with discovering the underlying values and social norms that shape the formation of opinions on road pricing.

Priority: High; Timing: Immediate

Introduction

In March 2004 the Department for Transport (DfT) awarded a contract to the Centre for Transport & Society (CTS) at the University of the West of England, Bristol, to conduct an evidence-base review of attitudes to road pricing. The review was to encompass attitudes of both the public and business, and include attitudinal research undertaken in other countries. Specifically, the objectives of the research were to:

1. undertake a comprehensive review of the evidence-base on attitudes to road pricing in the United Kingdom, and in other countries; and

2. highlight and prioritise areas where our understanding of public and business attitudes could usefully be developed.

The review project has been carried out by Professor Glenn Lyons, Dr Geoff Dudley, Dr Graham Parkhurst and Elisabeth Slater of the CTS. It has involved three main activities:

- pursuit of information and acquisition of documentation;

- compilation of the entries for a Research Compendium;

- distillation of key issues and findings from the documentation, and the subsequent formulation of recommendations.

An account of the process leading to compilation of the Research Compendium and this report is provided as Annex A. The Compendium catalogues and summarises around 200 reports, papers and other articles.

This report provides a full consideration of the contents of the Research Compendium. Nine topic areas of relevance have been identified and the report is structured accordingly. The topic areas in themselves provide an indication of the breadth and diversity of issues that must be addressed in any consideration of road pricing. These range from examining determinants of attitudes to road pricing, and how information is communicated, through such key issues as the relationships between technology and public attitudes, and questions of constructing equitable systems, to examining the reasons why schemes might succeed or fail. For each topic area key issues are highlighted and discussed with extensive reference to the Compendium entries (reference numbering in the main text corresponds to the numbering within the Compendium) and research recommendations are made.

As a background to considering *attitudes* to road pricing, Annex B provides a brief outline of the *types* of road pricing schemes dealt with in the report. The next section introduces some initial tabulations of results from attitude surveys. The section following then begins the discussion of the nine topic areas identified. Business attitudes are treated as a separate section, with public and political attitudes analysed within the various topic sections.

Attitudinal Surveys' Results

At the outset of this review exercise it had been anticipated that by drawing together a number of attitudinal surveys, it might have been possible to elicit new insights by comparing the results across studies. Annex C provides a tabulation of key results from 24 separate studies which have addressed public attitudes to road pricing. The tabulation offers an opportunity to compare public reactions to a range of propositions. There are some intra-survey and inter-survey observations that can be made.

'Revenue-return' versus 'no-return'

A number of surveys present the public with a base proposition about charging with no mention of something in return ('no-return') and then with the base proposition with the promise of the revenue being used to improve public transport ('revenue-return').

The Table below provides a comparison of the difference in 'net support' between the no-return proposition and the revenue-return proposition for surveys conducted in the UK. The figures in the Table are 'support to opposition ratios', i.e. the percent of respondents supporting the proposition divided by the percent of respondents opposing the proposition. Hence a ratio of less than 1 indicates net opposition while one greater than one indicates net support.

Ref	Year	Base proposition	'no-return' ratio (support/opposition)	'revenue-return' ratio (support/opposition)
025a	2000	urban congestion charging	0.51	0.95
025a	2000	motorway charging	0.18	0.37
025b	2001	urban congestion charging	0.79	1.80
025c	2002	congestion charging	0.53	2.52
107	2003	urban congestion charging	0.41	0.74
184	2003	charging in my area	0.52	1.53
079	2003	satellite tracking and charging system	-	1.75

With the exception of the last study in the Table (079) which was directed at frequent drivers, the other studies concern the general public. The Table reveals quite clearly that once investment to improve public transport is offered in return for charging the motorist, acceptance of charging increases. This shift is substantial in all these cases and in some instances marks a swing from net opposition to net support.

'Direct' versus 'indirect' returns on charging for the motorist

In a number of surveys of attitudes, people are asked to respond to propositions which involve on the one hand charging with an investment in improving public transport and on the other hand charging with a reduction in Vehicle Excise Duty or Fuel Duty. The first can be thought of as a less tangible or 'indirect' benefit to the motorist. Meanwhile the

second more readily symbolises a 'direct' return on the scheme for the motorist. The Table below compares the 'support to opposition ratios' for both the 'direct' proposition (a return to the motorist) and the indirect proposition (a return to public transport).

Ref	Year	Base proposition	'direct' ratio	'indirect' ratio
025a	2000	urban congestion charging	1.17	0.95
025a	2000	motorway charging	0.54	0.37
025b	2001	urban congestion charging (**VED**)	1.89	1.80
025b	2001	urban congestion charging (**FD**)	1.93	1.80
025c	2002	congestion charging (**VED**)	2.43	2.52
025c	2002	congestion charging (**FD**)	2.16	2.52
154	2002	road tolls (**VED**)	3.65	2.71
154	2002	road tolls (**FD**)	4.75	2.71
184	2003	charging in my area	1.57	1.53
079	2003	satellite tracking and charging system	2.28	1.75

On the one hand it can be noted that with the exception of the earlier 2000 survey, in the other cases, there is net support for charging irrespective of whether the 'direct' or 'indirect' proposition applies. Intriguingly in the case of the three Commission for Integrated Transport surveys (025a, 025b and 025c) there appears to be a shift between attitudes in 2000 to those in 2002. While greater support was shown for the proposition with a direct return to the motorist in 2000, by 2002 greater support was shown for the proposition for revenue investment in public transport (the indirect proposition). (Note that surveys 154 and 079 concern principal drivers and regular motorists respectively rather than the general public.)

Comparison limitations

This attempt to compare and interpret results within, but particularly between, surveys has limited merit. One can pick out such top level indications as considered above but beyond this it could prove misleading to proffer interpretations without a great deal of care given to attaining a thorough and unambiguous understanding of the nature, design and timing of each survey. For example, simply to present comparative Tables in the way done above, does not reveal anything about circumstantial factors surrounding the survey such as a recent period of media hype focused on the topic of the attitudes.

Intra-study comparison should, in principle, be much less ambiguous since the circumstantial factors may be the same, with the questions being asked within the same survey. However, if one consults the questionnaire such as that for 25b it becomes clear just how many separate questions a respondent is expected to address, often covering a range of topics besides road pricing. With so many questions it might be argued that it

becomes difficult for the respondents themselves to discriminate between different propositions with any meaningful rationale.

Such limitations on comparisons would tend to suggest that surveys are generally not designed with the expressed intention of being able to compare across studies. Though there are some exceptions – notably the time-series repeat surveys for the Norwegian toll-rings.

The report now moves on to probe much more deeply beyond simply the headline percentage figures presented as outcomes to attitudinal surveys and to thereby examine the range of factors that do or might have an affect on attitudes.

1 The Importance of Trade-Offs

A key theme in many studies and surveys is to place road pricing in a wider context of transport policies and variables, not only in terms of seeking ways to improve its potential acceptability, but also to analyse alternative means of achieving key objectives. These analyses generally involve some important trade-offs as a component of road pricing, such as between convenience, time and money; and effectiveness and acceptability. Although some important work has been undertaken on these topics, there is clearly much that remains little understood.

The hypothecation of pricing revenues and trade-offs in expenditure

Perhaps the most persistent finding across a range of national cultures is that the acceptability of road pricing improves significantly when the revenues are hypothecated to the development of transport generally (as noted in the previous section). This involves important trade-offs between charging levels and acceptability for the pricing scheme itself, and competing destinations for the revenues. For example, extensive consultation processes in Edinburgh showed that congestion charging would only be publicly acceptable if the revenues were spent on transport (023). However, the proposed charge of only £2 for the Edinburgh cordon scheme may limit the funds available to spend on transport(0148). Nevertheless, public attitude surveys undertaken for the Commission for Integrated Transport (CfIT) in 2001 and 2002 found that support for congestion charging grew significantly if it were proposed that funds were invested in improving public transport locally (025b, 025c). Similarly, surveys undertaken for the EU Transprice project found that investing in public transport emerged as the top priority for allocating pricing revenues (011a), while in Norway it was concluded that public acceptance of the Trondheim toll ring was relatively high because of the benefits of the transport package (062). Similar results were found in the USA (e.g. 080), and in Japan (089). In the case of the Norwegian toll rings, however, some critics have noted the dangers of longer-term trade-offs, such as toll revenues spent on improving the roads network attracting induced traffic, and so negating the lower levels of congestion brought about by the introduction of tolls (153).

At the same time, most of these types of studies have been undertaken in urban areas, and there appears to be a significant research gap in terms of examining how revenues might be allocated for national and inter-urban schemes. More basically, it could also be said that more needs to be understood about the limits within which motorists are prepared to exchange money for reductions in congestion. For example, one possible way forward here is through the concept of credit-based congestion pricing (CBCP) (04), where costs and benefits are made more explicit to a wide range of users.

Other trade-off variables

One important but apparently rather under-researched variable in the context of road pricing is the value of time. Thus revealed preference data from the San Diego I-15 congestion pricing demonstration project found that willingness to pay to reduce congested travel time was higher than previous stated results suggested (041). On the other hand, little appears to be known about the complex interrelationships here between time and money, although some work has been undertaken in Dublin (057) and Trondheim (138).

Another potentially important but relatively uncommon concept is that of variable pricing. In this context, a study of two bridges in Lee County in Florida argues that this represents

one of the few projects of its type in the world, and so provides unique information on how drivers react to a time of day variable toll in an uncongested environment. Although the financial incentive was only 25 cents for the majority of participants, significant changes in travel behaviour were observed. Thus it was found that those altering their behaviour were significantly different from those who had not. For example, those who altered their behaviour tended to be more likely to have flexibility in their time of travel; were more likely to be retired; were significantly older; were less likely to belong to the highest income category; and were more likely to have flexible working hours (039). Given that such sensitivities were found in an area not susceptible to heavy congestion, it suggests that there might be quite significant trade-offs between money and time of travel.

The key problem for pricing schemes of consequent traffic diversion is another phenomenon which remains perhaps little understood, particularly in terms of the factors which induce drivers to trade-off convenience for money. Thus Truelove points out that problems of diversion may be avoided by skilful and detailed planning of pricing schemes at the local level (002).

If road pricing schemes were to be implemented, then ways need to be found to combine effectiveness with acceptability. Work has been undertaken here by Jaensirisak et al (049), who sought to discover whether highly acceptable schemes are less effective in influencing mode shift. Intriguingly, they argue that although more highly effective charging schemes (with higher levels of charge) are less acceptable, more highly acceptable schemes (with lower levels of charge) are not substantially less effective (though of course revenues are affected). Thus their survey results suggest that, even at £1 per day charge, over 20 per cent of car commuters in Leeds and 30 per cent in London would be expected to switch to non-car modes or not to use a car at the charged time. They conclude therefore that the design of charging schemes should be primarily concerned with their acceptability, because any scheme is likely to be effective in reducing car use. This conclusion pre-supposes that the principal aim of a charging scheme is to induce mode shift (by no means always the case, particularly where hypothecated revenues are involved). However, more clearly needs to be understood about the dynamics of this vital trade-off.

Gaps in understanding prompting suggestions for future research:

- Public attitudes to hypothecation for inter-urban and national schemes.
- Drivers' attitudes to the monetary value attached to reducing congestion.
- Understanding the value of time in drivers' attitudes to road pricing schemes.
- Demand sensitivities to variable pricing schemes.
- Drivers' attitudes on the interrelationships between road pricing and traffic diversion.
- Means of combining road pricing schemes' effectiveness and acceptability.

2 Informed Attitudes

A significant amount of research has been conducted into public knowledge (or lack of it) about road pricing schemes, but it could be said that we need a more sophisticated approach in terms of defining attitudes, and how they change or can be influenced. Thus there are significant gaps in understanding the processes of knowledge acquisition, and how these may shape opinions. There are parallels here with other transport policies, and doubtless implementation of policy in many other sectors. To take one transport example, citizens who are likely to be affected by a proposal for a light rail scheme are often positive towards the proposal in general, 'in principle', terms. However, support often reduces once the specifics of the scheme, particularly its routing, are known, as the scheme will not provide the benefits expected by the optimistic individual, or the presence of environmental effects is revealed. In the case of road pricing, the initial assessment is more likely to be negative, but that may mean that information will hence reduce the negativity of the idealised conception.

Information provision and knowledge acquisition

Any proposed road pricing scheme needs to be one which can be amenable to public understanding. For example, the assessment of a credit-based congestion pricing scheme acknowledges that such a sophisticated system will require a significant degree of public education, and that its complicated character may itself be a barrier to public acceptance (004). On the other hand, some implemented schemes have apparently been more easily understood. Here, research into the London congestion charge six months after implementation by Transport for London (TfL) claims that there is generally a good appreciation of the key operational details, such as the level of the charge, availability of payment channels, and times when charging applies (021). However, in other cases there does appear to be a gap between information provision and knowledge acquisition by the public. Thus an examination of media relations and marketing for the San Diego I-15 congestion pricing project claims that both print and electronic media coverage was informative, balanced, timely and accurate (101). At the same time, focus groups within the same project found that, when asked what Express Lanes were called, participants were hard pressed to come up with an official name, and that this lack of clear product name and identity made discussions about the programme difficult (108).

Similarly, evidence from the EUROTOLL project indicates that in France, only 29 per cent of A7 users knew that the A75 was an alternative for long trips between Paris and the Mediterranean coast (181). In some instances, lack of information is seen as a factor in lowering public acceptance. Thus in the case of toll rings in the three Norwegian cities of Bergen, Oslo and Trondheim, the relatively small decrease in negative attitudes in Oslo before and after implementation compared with the other two schemes is partly explained by the lack of a promotional campaign (014). Similarly, an assessment of barriers to road pricing in the Netherlands argues that the government must pay greater attention to communication, particularly stressing the equity aspects of pricing (016). This conclusion is supported by the findings of the EURoPrice project, where it was recommended that marketing cannot be separated from consultation exercises, and that cities contemplating the introduction of any controversial schemes should provide adequate budgets (both manpower and financial) for both these activities, and should ideally engage specialists at an early stage (115a). A study of the electronic road pricing system in Singapore also concludes that societal concerns have to be addressed and public education instituted to win private users to the side of government (143).

Thus it is acknowledged that level of knowledge or awareness is a determinant of attitude. The underlying inference in these studies is that better information will tend to lower barriers to acceptance. This argument is extended by conclusions from the EU PRIMA project. Here it is argued that the kind of S-shaped time profile of acceptability often observed for successful new consumer products may also describe the process of urban road pricing acceptability. If that is the case, then the probability of cities joining the 'road pricing club' will grow rapidly once the number of club members reaches a certain threshold value (066). This implicit link between knowledge and acceptance is also evident in the argument of Schade in favour of direct voter participation through referenda, which should be preceded by phases such as public discussion and stakeholder and media involvement (009).

Knowledge and perception

Nevertheless, there is evidence to suggest that greater knowledge does by no means necessarily enhance the prospects for road pricing acceptability. For example, a business survey of attitudes to road pricing in the Bristol area found that, in the case of stated preference interviews, nearly 60 per cent stated prior to the exercise that they would find a charging scheme quite or very acceptable. However, when questioned again at the end of the stated preference exercise, fewer than 30 per cent now found the charging scheme acceptable (085). A similar pattern was found in the PRoGRESS project, where surveys in Edinburgh indicated that initially high levels of in-principle support for congestion charging tended to erode as successively more detailed designs were presented. Thus, "many car drivers automatically assume that they will be exempt from the charge (as they are a resident, key worker, etc.). When they discover that they will have to pay, they become opposed to the scheme." (178).

In contrast to the S-shaped profile, results gathered by PRoGRESS from Trondheim show a decline in negative attitudes in the years immediately after implementation of the toll ring in 1991 but then latterly the negative trend has been upwards (178).

Powerful cultural influences may also have significant effects in shaping attitudes. Thus a study of environmental awareness and acceptability of pricing policies in Germany found that people were less willing to pay higher taxes than in other countries, and that in designing communication strategies, governments must be aware of how highly people value mobility, and the symbolic social status of the car (065).

There appear to be significant gaps in our understanding of how, when and why people acquire knowledge, and the connection between this and the shaping of opinions. For example, people's motivation for learning about a road pricing project might be quite low when the scheme is at the planning or policy option stage. It is only when a scheme is actually implemented or imminent implementation is confirmed that they have the motivation to discover how it affects them. In this context, Jones concludes that research is weak about the dynamics of attitude formation over time, and the factors which influence this. He also argues that the whole question of how perceptions and attitudes towards charging are influenced by the media, personal contacts and government information campaigns remains a largely un-researched area, and a major inter-disciplinary challenge (060).

Gaps in understanding prompting suggestions for future research:

- The dynamics of attitude formation over time, such as the motivations of people to acquire knowledge.
- The interrelationships between knowledge acquisition and the shaping of ideas and opinions, for both policy makers and the wider public.
- How policy debates and perceptions on road pricing are shaped by the media and public information campaigns.
- How people acquire knowledge about implemented schemes, such as the London Congestion Charge.

3 Determinants of attitudes

Research has been conducted which reveals valuable and perhaps surprising insights into how public attitudes to road pricing may be formed. At the same time, these findings in turn raise further questions concerning the complex interrelationships between public perceptions and policy. As a MORI poll on attitudes to road pricing points out, they may be dealing with perceptions rather than facts, but perceptions are facts to those who hold them (019).

Social versus self-interest

A prominent factor in determining public attitudes to road pricing is the inherent tension between subscribing to motives of self-interest or those for the good of society as a whole. Jaensirisak expresses this dilemma in terms of selfish and social perspectives, and argues that these are likely to involve drivers in individual decision processes when they evaluate schemes. This may give a reason why road user charging is unacceptable to many car users and acceptable to some car users, even though they would be charged. Pilot results here demonstrate that car users hold different perspectives between selfish and social. Consequently, it is argued that these drivers see themselves as worse off, but also that society is better off as a result of pricing. However, non-car users perceive both themselves and society as being better off (048).

Nevertheless, other research suggests that people are capable of expressing opinions which do not necessarily favour self-interest. For example, a MORI poll for the Commission for Integrated Transport in 2001 found that there was broadly equal support for motorway tolling, regardless of whether the benefit was to the motorists themselves in the form of cuts in the price of petrol or the abolition of VED, or to society as a whole in the form of investments in the transport system (025b). In this context, Steg makes the important point that pricing strategies will only be effective if the underlying assumptions are met. Consequently, the choice of strategies for behaviour change should be based on knowledge of the main antecedents of the behaviour that has to be changed (069). Enlarging on this point, Schade and Schlag believe it is vital to look deeper into the question of which determinants influence the amount of acceptability. For example, is it just the price level, or are there other important factors? (058). In contrast, Stopher argues that people may be more tolerant of congestion than is generally supposed, and that road user charging will not be effective in the long term aim to reduce congestion. Instead, the real value of road pricing is to enhance economic efficiency (168). There was some support for this conclusion in the survey conducted as part of the Office of National Statistics Omnibus in March 2003. Here, 58 per cent of respondents agreed with the statement: "congestion is acceptable so long as delays are predictable" (184).

One of the relatively few studies which addresses directly these underlying values has been undertaken by Holzer, who examines the role of policy objectives in determining acceptability. He concludes that it is possible to enhance acceptability just by using an angled mode of communication, such as stressing the use of road pricing revenues for transport investment (071).

Purpose of pricing and social norms as determinants of behaviour

Apparently similar schemes can have quite different primary policy objectives. For example, the cordon toll rings in Norway have been perceived primarily as a means of raising revenues for transport investment (e.g. 014, 027), while the principal aim of the London Congestion Charge is self-evident (020b). On the other hand, a ROCOL 1999 survey

of London drivers found that virtually no one viewed it as an attempt to control congestion, but perceived it as just another tax (024). This again highlights the issue that perceptions (even if wrong) can often be facts to those who hold them.

An intriguing finding of several surveys in recent years is that social norms can have an important effect on attitudes. For example, Jakobsson et al found in a Gothenburg survey that lower income car drivers are less willing to accept road pricing because they perceive it infringes on their freedom and is unfair. At the same time, expectation about others' intentions was found to be another determinant of car use reduction (005). Similarly, Schade describes how the EU AFFORD project found that the variables 'social norms', 'personal outcome expectations', and 'perceived effectiveness', are positively connected with acceptability of pricing strategies. On the other hand, the results reveal that socio-economic characteristics (e.g. income), influence the perceptions, attitudes and evaluations of respondents to pricing strategies only to a minor extent (064). Another example of what could be described as social norms through expectations is provided by an RAC Foundation survey of 500 drivers that sought to look ahead fifty years. Thus by 2050, 73 per cent of those surveyed expected to see charges in all major towns, with 71 per cent expecting tolls on motorways, and 31 per cent on all roads (154).

It could also be said that the apparent success of a major scheme such as the London congestion charge shifts norms and expectations internationally. For example, a Deloitte survey of major cities in fifteen European countries taken shortly after implementation of the London scheme found that more than 72 per cent of them are either interested in, or already proceeding with, a road pricing scheme (172). Similarly, research in Edinburgh has repeatedly shown that the public are much more likely to support road pricing if they have heard of its successful implementation elsewhere (178). However, in Canada there were divergent responses to the introduction of road pricing in London. Thus the Transport Minister spoke in favour of road tolls for large Canadian cities, and this was supported by transit advocates. On the other hand, the transport minister's statement was criticised by a number of municipal and provincial government leaders (183).

The trajectory of the research on determinants of public attitudes to road pricing therefore suggests that much more needs to be understood about the links between underlying values and the formation of attitudes. The attitudes themselves also appear to be more than just the reflection of self interest, and so more research is needed on the design and presentation of possible pricing schemes to discern means of maximising the number of 'winners' (071). There also appears to have been relatively little work done on the interrelationships between the actual use of road pricing schemes and shifts in the public attitudes of those who use them, as well as attitudes of those who decline to use them.

Gaps in understanding prompting suggestions for future research:

- Identifying types of social norms which may determine public attitudes to road pricing
- The links between stated purposes of pricing schemes and the development of public attitudes
- The potential for the design and presentation of possible road pricing schemes which may maximise the number of 'winners.'
- The dynamics of the interrelationships between the actual use of road pricing schemes and the formation of attitudes of those who use them, as well as the development of attitudes of those who decline to use them.

4 Disaggregating the public

Public attitudes to road pricing can never be regarded as homogeneous. There is therefore always a danger of over-simplifying categorisations, and so failing to identify significant respondent characteristics that can help to explain differences in attitudes. Consequently, geographical, spatial, social and institutional differences, and the interplay between them, can all represent significant elements in explaining attitudes.

Geographical and spatial factors

One persistent survey finding in the UK is that attitudes to road pricing are historically more sympathetic in London than in other parts of the country. For example, surveys of the general public by MORI for the Commission for Integrated Transport in 2000 found that, while support for road charging policies was not necessarily any higher in London, opposition tended to be lower. Thus net support for charging- if money is channelled back into public transport-is +10 in London, compared with –2 nationally, while net support for severely restricting city centre access is +25 in London, compared with +17 nationally (025a). MORI found similar types of differences in its 2001 CfIT survey, and not just on the matter of urban congestion charging. Thus opinion in London on motorway tolling was more or less evenly split (37 per cent support, 40 per cent oppose), whereas in the rest of the country 61 per cent were opposed to such a scheme (025b). This divergence has persisted over a number of years. For example, an overview of surveys taken in the early 1990s also found significantly greater support for road pricing in London than elsewhere (155). Similarly, an Office of National Statistics survey of July 2003 found that 47 per cent of respondents nationwide believed the congestion charge had been good for London, while 17 per cent disagreed, and 36 per cent did not know. In London, opinion was more polarised, with 63 per cent believing the congestion charge had been a good thing, and 30 per cent disagreeing (184).

These differences might be attributed to the greater percentage of the population in London who use public transport, or the higher levels of traffic congestion in the capital, although the reasons for these marked differences does not appear to be entirely clear. Indeed neither is there an understanding of what distinguishes supportive Londoners from unsupportive Londoners.

Contrasting attitudes to road pricing in different types of cities is also evident in other surveys. For example, a survey of restraint-based travel-demand management measures found that acceptance tended to be approximately 12 percentage points higher in Newcastle than in Cambridge. The authors speculate that this may be caused by the much larger size of Newcastle, or a reflection of lower levels of car ownership in Newcastle compared with Cambridge, but again the dynamics of attitudes here is not entirely clear (036). It should be noted, however, that the Newcastle and Cambridge surveys were undertaken some five years apart.

Surveys undertaken by Transport for London also indicate varying attitudes within and outside the Congestion Charging zone. Thus surveys taken by TfL immediately prior to implementation of the charge focused on seven different ‘neighbourhoods’- three in the zone and four outside. Overall, the three most frequently anticipated benefits of charging were reduced traffic congestion, better public transport, and improved air quality. However, the proportions of respondents anticipating these benefits varied depending on where they lived, with those living beyond the M25 most likely to respond positively (020b). The importance of understanding differences in attitudes between the inner city and the suburbs is pointed out by Hensher, who argues that any expansion of the London

Congestion Charge will not be just a matter of changing boundaries, as the rest of London has a different profile of offices and residences, and would require substantial exemptions for residents. Given that a lot of these residents use cars in London, the gains are likely to be far less than experienced in the City (044). In addition to understanding better the reasons for differing attitudes in different urban areas, therefore, there also appears to be significant scope for further analysis of contrasts in attitudes between inner city and suburban areas.

In addition, although there are a few studies which examine the possibilities of road pricing in rural areas which attract large numbers of visitors, such as the National Parks (029, 054), the study of attitudes to road pricing generally of those living in rural areas appears to be a neglected field.

Social and institutional factors

Research undertaken by the Automobile Association (AA) attempts to identify more precisely not only the attitudes of car drivers with regard to road user charging, but also the underlying opinions and perceptions which shape these views (111). Thus the AA believes that policy makers need to have a much greater understanding of the attitudes of drivers as customers (082). It could nevertheless also be said that the attitudes of non-drivers is another area where little specific research appears to have been done, particularly in terms of how this important section of the population may or may not benefit from various types of road pricing schemes.

The public can, of course, be disaggregated into many different groups, such as age, gender, income etc. Research in the USA into road pricing schemes, known as the value pricing programme, has undertaken work in these fields. For example, research into the use of tolled freeway lanes, known as Express Lanes, made the important finding that both high and low income groups used them, although high income users were more likely to use them frequently (018). In this context, it could be said that it is particularly important to relate these types of findings to evidence cited in the previous section (on determinants of attitude) that social norms are more significant than socio-economic characteristics as predictors of behaviour.

Institutional factors may also be significant in terms of contrasts in perceptions, particularly those between institutional or corporate stakeholders and the wider public. For example, a Northern Ireland consultation process showed significant support for urban congestion charging with hypothecated revenues amongst institutional and corporate stakeholders, but significantly weaker support in the case of public surveys (110). This type of finding suggests more needs to be understood about how these marked discontinuities in perception come about.

It is notable that few articles reporting the results of attitudinal surveys attempt, to any substantial extent, to disaggregate their survey sample or to pinpoint respondent characteristics that are significant in determining attitude. The emphasis, instead, appears to be to offer a snapshot of the collective balance of opinion. This situation can be compounded by the fact, as noted in an earlier section, that attitudinal surveys are often addressing a range of different transport issues and hence road pricing is one rather than the primary consideration.

Gaps in understanding prompting suggestions for future research:

- Greater understanding of reasons for contrasting attitudes to road pricing between geographical areas, such as different towns and cities, inner city and suburban areas, and those who live in rural areas
- Comparisons of underlying perceptions towards road pricing of both car users and non-car users
- Comparisons of socio-economic factors and social norms as determinants of attitudes and behaviour on road pricing
- Determinants of contrasting perspectives brought about by institutional factors, e.g. between elite stakeholders and the wider public

5 Attitude shapers

A salient issue such as road pricing involves not only various levels of government, but also a wide range of interests on all sides of the debate. However, surprisingly little appears to be known about how this process actually works in practice, with apparently few systematic analyses of the dynamics of the policy process. This is not just a point of academic interest, for a greater knowledge of the way the various elements of the process interact over time, can allow everyone an opportunity to gain important insights into the chief influences over policy change.

The policy process

Viegas and Macario provide one of the few attempts to develop an analytical framework for the policy process surrounding road pricing. Although written from the viewpoint of acceptability, they believe that this is as dependent on practical/functional issues, and the convictions and beliefs of the stakeholders, as on its economic principles and foundations. By examining the work of the EU PATS programme (on which their research is based), they argue that a discursive approach clarifies the different value frames and assumptions underpinning arguments that are central to debates, and strives to make the intractable issues surrounding transport choices more 'tractable,' and therefore improve policy deliberation and learning. For example, they note that the careful choice of which authority regulates, administers and implements any pricing measure, and the legitimacy that such an agency has in the eyes of stakeholders, may have an important influence over acceptability (068). In this context, it has been recommended that a single layer of government should have responsibility for introducing schemes, and with a realistic period for development, as in London (179).

The interrelationships between different levels of government, and the networks of interests which surround them, play an important role in determining the trajectory of policy, but in the case of road pricing few attempts appear to have been made to set out and explain how this process works. One notable exception is provided by Cain and Jones, who describe in detail the six phase consultation process undertaken for the progress towards introducing congestion charging in Edinburgh. This includes the case put forward to the Scottish Executive that eventually led to an arm's-length delivery agency being established in the form of Transport Initiatives Edinburgh (tie) (015). Such consultative and inter-governmental processes as this clearly involve a wide range of views and networks of interests, and provide fruitful insights into the practicalities of policy making and implementation.

The role of the policy process in determining outcomes is clearly a matter of concern and debate in a number of countries. For example, a study of the failure of road pricing proposals in the Netherlands emphasises particularly institutional and political barriers to implementation. Thus the opposition of the three million member Dutch Automobile Association to the proposal for peak hour cordon charging in the largest urban areas was a key factor in its withdrawal by the minister (016). On the other hand, the successful implementation of the Melbourne City Link, one of the world's first and largest fully electronic road tolling systems, is described as a courageous project in a conservative city (032). In the case of the urban toll rings in Norway, factors in the successful implementation included the fact that the benefits of improving the road system were quite obvious to both the politicians and the public, and the major political parties agreed not to make the implementation of tolls a major issue (062). Notably in Trondheim, there was particular emphasis placed on achieving a wide consensus on the tolling scheme (124),

while there was also a close relationship between influential local politicians and the County Roads Office (182).

However, in the case of Hong Kong in the 1980s, a pilot congestion pricing scheme was abandoned partly through community participation and consultation not being well handled, and the government failing to be specific about the use of revenues (158). In Stockholm, the bumpy road to implementation of a charging scheme has included massive protests from the motoring organisations and political opponents (109). In all these cases, a better understanding of how the policy process operates in practice could at least assist in facilitating a more informed debate.

Leadership and mapping the interests

Within the policy process, the role of leadership and policy entrepreneurs also appears to be of significance in shaping policy. For example, the role of Ken Livingstone as London Mayor appears to have been an important factor in carrying through the Congestion Charge to implementation (109). Similarly, a guide to the setting up of High Occupancy Toll (HOT) Lanes in the USA emphasises the importance of project champions. Nevertheless, leadership is an important factor on all sides and at all levels of the policy debate, and there are few studies of the dynamics of this role in the case of road pricing.

The number of interests and institutions which may participate in the policy debate is, of course, extremely wide. To take just three in the case of the British debate, with examples of their work: the House of Commons Transport Committee issued a report on Urban Charging Schemes in 2002-03 which concluded that hypothecation is crucial to the acceptability of road pricing (055); The Commission for Integrated Transport produced a report in 2002 which proposed a fiscally neutral policy on charging (056); and the AA undertook research on public attitudes to road pricing in 2002 which included proposals for contracting out of motorway use and an independent trust fund for roads (111). Again, little research appears to have been done on mapping the principal interests involved in the debate, and the dynamics of their policies. Such work would provide a valuable input in revealing potentially important trends in the policy debate.

The media and attitude surveys

Although there is little or no evidence to apparently substantiate this, the media can or could colour the results of a particular survey and hence the need to attempt to identify any such externalities which set an influential context for the attitudes recorded is crucial. One could suggest that the dissemination of attitude survey results can themselves shape attitudes. For example, an attitude survey of members by a motoring organisation might see the survey results relayed back to the many millions of its members whose views are then coloured.

Gaps in understanding prompting suggestions for future research:

- A greater understanding of the configuration and dynamics of the networks of interests which surround the issue
- A greater understanding of the configuration and dynamics of the interrelationships between different levels of government
- Examinations of the role of leadership in influencing the direction of the policy process.
- A mapping of the principal interests involved in the road pricing debate, and analyses of their policy dynamics

6 Technologies

Technological developments in recent years have apparently opened up considerable possibilities for facilitating a wide range of road pricing schemes. Nevertheless, these very advances in themselves pose fresh problems in terms of being reconciled with public and political attitudes. Issues of road pricing technology and privacy also appear to be a relatively under-researched area, given the potential public sensitivity on this point.

Technology and its significance for public and political attitudes

The rapidly evolving field of road pricing technology means that new social and political circumstances and issues are emerging which impinge on processes of policy making and implementation. For example, Truelove makes the significant point that the manufacturers of road pricing technology may become more prominent actors politically (002). More fundamentally, there is a clear connection between the efficiency of the technology and the likely acceptability of the scheme. Put basically, if the technology does not work, or is not easily understood by the public, then its credibility is fatally undermined. An example here is provided by a plan to introduce congestion metering in Cambridge in the early 1990s. There appeared to be support for this plan, but one reason for the failure to implement was that it was viewed as being too complicated and ambitious (028).

In a pilot electronic tolling scheme in Leicester, there were severe problems for users in applying the technology. Thus 23 per cent found that the on-board unit had fallen off. Some users improvised and used Blu-Tack and Sellotape, while one user even held the unit while passing the electronic beacon (132). In the case of the London congestion charge, however, considerable emphasis was placed on the technology working efficiently from the outset, and being understood by the public (021).

In the case of a number of implemented schemes, there has been an awareness that they must be adapted to the needs and sensitivities of the public. Thus the Trondheim Toll Ring introduced an electronic tag, which was given away free in order to encourage public acceptance. There is discount pricing for those with tags, and there has been a high participation rate (003). In Trondheim, there was official awareness of promoting the image of 'the city of technology' and this helped to gain public acceptance (182).

With regard to the Norwegian tolling system as a whole, it is also concluded that schemes must be flexible enough to be adjustable to shifting political preferences, and that implementation is most likely to succeed when starting with crude systems which may be developed and refined over the years (045). In Bergen, one reason for public opinion shifting from strong opposition before implementation to cautious support after the tolling scheme was brought into operation was because of the lack of expected queues at the tollbooths (062). In some cases, technology can provide surprising outcomes. For example, in the case of the London congestion charge it was not expected that there would be a high utilisation of SMS text messaging as a payment vehicle, but after two months phone-based text messages accounted for 15 per cent of all payments, rising to 18 per cent one month later. This illustrates the wider point that user response is dynamic, and that many matters can shift significantly once a scheme is implemented (127).

However, perhaps the most notable example of technology being adapted to public sensitivity is provided by the Melbourne City Link, where the electronic toll system was duplicated by a camera based system in order to improve its acceptability on equity grounds. This duality was not considered necessary on technological grounds, but that the

public would more easily accept a tolled road if it was clearly demonstrated that payment evasion was kept to a minimum (032). This highlights that not only must the public easily understand the technology but they must be confident in its reliability and effectiveness.

These examples illustrate the importance of ensuring that technological systems are tailored to local needs and cultures. Grieco and Jones here make the perceptive point that the current political and technical organisation of Europe allows Euro-projects to 'migrate' in search of comfortable accommodation in response to changing circumstances. Thus although the political failure of a technology to gain acceptance in the country it was developed may represent something of a failure, if it gains acceptance elsewhere in Europe it should not be considered a failure in European terms. The flip side to this trend is that the piecemeal introduction of road pricing contains the danger that incompatible technological systems or approaches will be adopted (035). Nevertheless, Jones also argues that although technology allows greater scope for design, there is an impression that many proposed schemes remain unimaginative (060).

There appears, then, to be considerable scope for future research on not only matching road pricing technology to public attitudes, but also designing schemes which maximise the number of 'winners'. One possibility in this context is that research may address the potential of developing the joint implementation of road pricing and motorist information systems (081).

Technology and privacy

Perhaps surprisingly, there appear to be few studies which examine at any length the important issue of road pricing technology and the protection of privacy. Some schemes have clearly given considerable thought to this issue. For example, in the case of the Trondheim toll ring, data is deleted each night for that day (003). Similarly, privacy was also built into the Melbourne City Link, as this was considered a sensitive subject in Australia (032).

On the other hand, a survey of local councillors and officials, academics and representatives of transport interest groups in Britain found that the principle of pricing and matters of privacy was considered less important than public transport provision and the use of revenues (033). Similarly, only a small fraction of the 240 EU politicians, experts and stakeholders interviewed as part of the PRIMA project considered individual privacy as a major issue. However, some thought that arguments of dangers with regard to data protection would become useful in a fight against road pricing (066). Evidence collected by the PRoGRESS project suggests that privacy is becoming less of an issue for today's population. Thus people "feel more and more that there are so many ways in which their movements can be traced, if authorities want to do it, be it through CCTV cameras that are present in so many places in today's cities, mobile phones, bank cards or many other means of modern technology, that payment or enforcement channels for road user charging would not make any real difference any more." (178). It could be argued, nevertheless, that questions of privacy in the EU will become more salient if road pricing becomes a more popular policy solution. Latest national survey evidence in the UK (185) reveals greater support than opposition concerning the prospect of information being held on where they have travelled for the purposes of determining charges to be levied.

Gaps in understanding prompting suggestions for future research:

- Greater understanding of the links between the development and efficiency of types of road pricing technology and ease of public use
- The dilemma of matching road pricing technology to local circumstances with the need for technological harmonisation
- Adapting road pricing technologies to public and political attitudes on matters of equity and fairness
- The possibilities for integrating road pricing with the development of motorist information systems
- Adapting road pricing technologies to public and political attitudes on matters of privacy

7 Equity

Several surveys in different countries and continents emphasise that considerations of fairness are major determinants of the public acceptability of road pricing. Nevertheless, the concept does not appear to be widely researched, or to exist as an integral component of proposed and implemented schemes. One problem here is to identify how perceptions of fairness may differ between a range of stakeholders. For example, concepts of fairness may differ between those who live inside or outside a charging zone, or between car users and non-car users. However, a widespread perception that a pricing scheme is operating on an equitable basis is likely to be an important factor in its public acceptance. The concept of freedom is also linked to fairness, although reconciling the two can create policy dilemmas.

Fairness and public attitudes to road pricing

The previous section noted how considerations of equity were built into the Melbourne City Link through a dual technology system which reduced the dangers of evasion (032). However, such practical examples of equity considerations appear to be relatively rare, and much of the debate so far has been on the theoretical level. This is despite the fact that the results of several surveys have shown equity to be a prime element in acceptability. Perhaps the most notable example here is represented by a comparison of surveys undertaken in cities in Japan, Taiwan and Sweden (046). Although the results showed that acceptance of road pricing was higher in the Asian samples than in Sweden, and that perceived fairness was significantly lower in Sweden than in Japan, acceptance varied directly with fairness. The results therefore showed that fairness significantly increased acceptance in all samples, and that the regression coefficient for fairness was the largest. In the Japanese sample the regression coefficient for fairness was larger than in the Swedish and Taiwanese samples. The authors conclude that the importance for acceptance of fairness and freedom in Sweden and Asia suggests that these factors may transcend cultures.

Motoring organisations appear to be particularly aware of the importance of fairness in acceptance of pricing policies by their members. Thus an international survey by the AA of 22 motoring organisations sought information and views on paying for road use. It concluded that major campaigns by motoring organisations *against* increased taxation and new charging proposals have a high success rate if they are not seen as fair by members (053). At the same time, it is important to identify contrasts in perceptions of fairness across the range of stakeholders, which can assist in the design of schemes and improve the chances of widespread acceptability.

Jones identifies two broad categories of equity in relation to road user charging: spatial equity, relating to the geographical location of the individual or organisation affected; and social equity, concerning impacts that relate to the personal, economic or social characteristics of an individual organisation etc. The variety of perceptions of fairness is indicated by his conclusion that schemes can be designed to meet such concerns as: "everyone must pay their fair share," "impacts on shopkeepers and businesses should be minimised," and "service and goods vehicles should get priority." Net toll revenues can also be invested to reduce inequities, such as through improving the environment for shoppers (007).

Matters of social exclusion are also clearly of high salience in questions of equity. As Proost argues, equity value judgements need to be based on the relative income position of the parties involved (117). In one of the few studies to consider impacts of road user

charging on social exclusion, Rajé et al found that in two cities (Bristol and Nottingham), Asian participants travelled half the total distance of white participants. Yet reliance on a car/van for trip-making was found to be particularly high amongst Asian residents. It was concluded that the Asian population could potentially be more vulnerable to direct cost impacts of charging (137). Consequently, in practice, high income, high value of time motorists will benefit from charging, but low income, low value of time motorists will suffer disbenefits, and this is regressive in terms of income redistribution (097).

The allocation of pricing revenues is clearly an issue of vital importance in considerations of fairness. Oberholzer-Gee et al argue that, with regard to matters of equity, previous studies that compare the relative effectiveness of compensation mechanisms suggest that compensating those who lose is easier if compensation remains in the same 'dimension' as the losses. This is borne out in surveys that ask road users to allocate pricing revenues. Increases in road investment are by far the most popular measure. They believe also that equity would be improved if revenues were used to improve environmental quality in lower-income neighbourhoods (038). This conclusion again illustrates the importance of understanding different perceptions of fairness amongst stakeholders, and incorporating responses to these in scheme design.

Another aspect of spatial equity is illustrated by the case of the proposed Edinburgh congestion charge, where the City Council has made the controversial decision to exempt its own residents living in the west of the city from paying the charge, even though they live outside the outer cordon. This has angered neighbouring local authorities, such as Fife, West Lothian and Midlothian, where the residents would be compelled to pay the charge. They believe that this represents a discriminatory regime of charging, and should be rejected by the Scottish Executive (148).

Fairness and freedom

Jakobsson et al hypothesise that acceptance of road pricing by private car users is determined by their perceptions of how fair the increase is and how much it infringes on freedom. This will hold however important the purpose is perceived to be, such as financing infrastructure. Thus perceived fairness and infringement on freedom are proximal determinants. They claim that a survey of car owners in the Gothenburg area supports this hypothesis, with lower income car users less willing to accept pricing because they perceive it infringes on their freedom and is unfair (005). This apparent connection between freedom and fairness suggests that more needs to be understood about how users of road charging schemes may perceive that they impinge on their freedom. On the other hand, increasing the fairness of a scheme for some stakeholders may reduce the freedom of others, such as by raising tolls in order to improve the environmental quality of a neighbourhood.

The connection between freedom and fairness may be stronger in some cultures than others. For example, a survey in Germany concluded that people there are generally suspicious of government setting restrictions and rules that affect their freedom of choice (065). At the same time, Bamberg and Rolle caution that, although perceptions of freedom and fairness can be important determinants of attitudes, factors such as the perceived effectiveness of a measure in solving a problem may be equally important (072).

Gaps in understanding prompting suggestions for future research:

- A greater understanding of the different perceptions of fairness amongst the range of stakeholders, and how these may be incorporated into scheme design
- The interrelationships between perceptions of fairness and the allocation of pricing revenues
- A greater understanding of how perceptions of freedom may be connected to those of fairness

8 Business attitudes

Surveys of business attitudes to road pricing represent a distinct minority compared with those for public attitudes as a whole. Even within the surveys themselves, there is generally a tendency for their scope to be restricted in terms of the size and type of businesses contacted, rather than be representative of a wide range of organisations. In addition to representative surveys, more needs to be understood about how business interests acquire knowledge about road pricing schemes, and how their underlying values and attitudes on this issue may shift over time. It could also be said that more needs to be known about the structure and dynamics of national and local business networks, including such basic facts as who represents businesses when responding to surveys.

Business and problems of representative surveys

One of the few large scale longitudinal surveys of business attitudes to road pricing has been undertaken by Transport for London in association with the introduction of the London Congestion Charge. Thus the first survey, conducted prior to implementation, included the objectives of considering the impact of congestion charging on long term trends, and understanding how the business community perceives, responds to and is affected by the charge. The methodology included face-to-face interviews, a telephone based survey, and a separate depth-interview survey to deal with specific issues. In addition, employee travel surveys among a sub-set of respondents are being conducted. Collectively, assessment drew on data from over 650 organisations, the intention being to re-visit the same organisations at intervals over the following four to five years (020a).

This type of large scale longitudinal business survey appears to be very rare anywhere in the world, and has yielded some insightful data. For example, the first survey found that the overall level of awareness of the scheme was relatively low, with only one-quarter of in-depth respondents feeling that they 'knew quite a lot about it.' The survey published one year after implementation found that the impacts of charging varied considerably by economic sector. Thus the internationally important business services and financial sectors in central London had benefited from reduced congestion, while distribution businesses reported a more mixed picture. However, retail and leisure businesses inside and immediately around the zone were typically reporting a 2 per cent reduction in sales for the first half of 2003, with food and confectionery-tobacconist-newsagent businesses typically reporting reductions of 6 per cent (022). In its second annual report on the Congestion Charge, TfL concludes that a range of factors have contributed to the fortunes of business, and that the Charge has had little direct impact (174b).

Significantly, other business surveys on the London Congestion Charge reflect this varying impact on size and type of firm. Unfortunately, the surveys themselves were restricted in terms of their breadth. For example, a survey of 500 companies commissioned by the business group London First found that 72.2 per cent believed the congestion charge was working, and 14.4 per cent believed it was not working. However, 35.2 per cent of the companies surveyed had over 1000 employees-a type less likely to be detrimentally affected by the congestion charge (047). On the other hand, a survey published by the London Chamber of Commerce and Industry a year after implementation found 79 per cent of those responding said that takings were down on the previous year. In the case of this survey, however, the respondents were overwhelmingly at small and medium enterprise level, with around three quarters employing less than 12 staff (077b).

Similar results were obtained from a business survey conducted six months after implementation of the Congestion Charge by Westminster Council. Here, 8.3 per cent said

that the Charge had had a positive effect on business, and 68.9 per cent that it had had a negative effect. Of the questionnaires returned, 61 per cent of the businesses employed ten or fewer people (078). The character of these surveys therefore emphasises not only the important need for representative samples, but also the requirement to understand the needs of various types and sizes of business in terms of designing and implementing road pricing schemes.

In this context, the EURoPrice study identifies two central points for effective business community consultation: establish an on-going relationship with the business community; and develop a mutually agreed long term strategy for future consultation activities (115b). Levine and Garb argue here that a congestion pricing policy rooted in accessibility would build in inherent linkages to ensure that, as auto travel is made more expensive in time and money terms, access by other means is rendered more affordable (123).

Underlying attitudes and long term effects

In addition to surveys directly concerned with attitudes to road pricing, there also appear to be few analyses of the motivations and values underlying business opinion. One exception here was conducted by Whitehead by means of 20 close dialogue interviews with business leaders in Nottingham. This found that fears regarding the economic impact of road user and workplace parking charges were based on scepticism and lack of confidence in the ability of government to spend revenues wisely. Intriguingly, it also discovered that business may be as much concerned with fairness and equity issues associated with charging, as they are with the potential for economic displacement (084).

This type of understanding of business motivations can prove vital in the framing of road pricing policies. Other surveys have been conducted which attempt to assess business response to charging (e.g. 030, 034, 050, 085), but there clearly remains much to be understood about this important subject.

There also appear to be a lack of studies which attempt to examine the structure and representative character of national and local business networks in relation to the road pricing debate. The diversity of surveys on the London Congestion Charge is a case in point here.

Gaps in understanding prompting suggestions for future research:

- Representative surveys of business attitudes to road pricing which compare organisational effects by economic sector, size and location
- Analyses of underlying business attitudes designed to ascertain how the effects of road pricing schemes may be mitigated in order to maximise the number of business 'winners'
- Longitudinal studies designed to discover how business knowledge and attitudes towards road pricing may shift over time
- A greater understanding of the structure and dynamics of national and local business networks, in terms of their contribution to the road pricing debate

9 Success and Failure in the Introduction of Road Pricing

Although road pricing remains a relatively uncommon phenomenon worldwide, there is a wide range of schemes in action that now allows analyses to be made of factors enabling their successful implementation. There are likely to be significant social, political and economic barriers to the introduction of almost any road pricing scheme, but experience in a number of countries has indicated that these obstacles can be overcome. Although there will always be a site specific element to any scheme, it would undoubtedly be valuable to at least attempt a comparative study which might throw light on common elements for success. In this context, there are surprisingly few studies which specifically compare implemented schemes. Similarly, there are few studies which attempt cross-national comparisons of failed and aborted schemes. By such means, it could be possible to construct a type of 'best practice' guide to policy making and implementation.

Scheme success and failure

Although comparative studies are uncommon, there are a number of articles which examine reasons for the success or failure of specific schemes. For example, the London Congestion Charge has inevitably attracted attention here. Factors noted for success include: a traffic problem too appalling to be tolerated; sufficient public transport to provide an alternative; a stubborn and bold politician in Ken Livingstone; political stability; a relatively simple and easily understood technology; interest groups not fatally weakening the scheme; a single implementing agency not dependent on other agencies for success; hypothecated revenues; a clear procurement strategy; and strong project management (017, 043, 044, 109, 145). Surveys of attitudes towards congestion charging taken by TfL before and after implementation show an overall shift of opinion towards favouring the scheme and its effects, with four-fifths of those who expressed an opinion considering that the scheme had been effective in achieving its primary objective (174a). In this context, an assessment of public opinion about value pricing in the USA concludes that the public view of pricing can shift over time (129).

In the case of Norway it was concluded that public support for a tolling scheme is unlikely to be strong or spontaneous, but political acceptance is possible. The latter can work because several key interests overlap, so that compromises are possible. In addition, rules for the use of revenues open up possibilities for flexibility and the compensation of losers. Implementation is also most likely to succeed when starting with crude systems which may be developed and refined over several years. In Norway, however, there was the distinctive objective of the schemes being set up for fund raising purposes, although it is also believed possible to achieve some demand management effects (045).

In the USA a guide for HOT lane development recommends that key issues for public acceptability include education, equity, finding project champions and user benefits (013). For the Melbourne City Link in Australia, success is attributed to a clear business strategy which meets public needs, and concludes that this tolling project has been a success technically, politically, and socially (032). In the case of Singapore, the first country (in 1975) to implement an area licensing scheme to relieve congestion, a survey found that 75 per cent of respondents felt that it was fair to charge vehicles according to the congestion they caused, and more than 60 per cent supported congestion management measures other than high vehicle ownership taxes (158).

On the other hand, other countries have failed to implement road pricing schemes. For example, in the Netherlands institutional and political barriers are seen as particularly important, and it is concluded that government must pay great attention to

communication, particularly stressing the equity aspects of user pricing. It is also believed important that the proposal has no loose-ends which may be seized on by opponents (016). In Hong Kong, the failure of a congestion charging pilot scheme in the 1980s was attributed to a number of factors, including the pilot scheme coinciding with the completion of significant new infrastructure capacity; a poorly handled community participation and consultation exercise; and the government failing to be specific about the use of revenue (158).

Identifying best practice

In one of the few studies which specifically addresses the question of why some schemes have succeeded and others failed, Ashmore and Gammie argue that there appear to be factors that seem able to tip the balance so that public unrest is insufficient to force a government or municipality to abandon a scheme. In descending order these factors are: a strong political position; a single empowered agency; a public perception of need; ring fencing of revenues; time invested in the development phase; and proven technology. They believe, therefore, that in London, Singapore and Melbourne a strong political position for those in power allowed charging schemes to go ahead. Conversely, political uncertainty in the Netherlands and Hong Kong undermined pricing proposals. Otherwise, they conclude that perhaps the most important thing that can be done is to dedicate a group of people to the task of developing sellable schemes through the process of public consultation, so as to package schemes that show clear wins to the public (043).

Significantly, the conclusions of the EU PRIMA project, designed to analyse the reasons behind the acceptance or non-acceptance of road pricing schemes and to produce policy recommendations and guidance for implementation of urban road pricing in Europe, largely complement those outlined above. These factors include the site specific one of schemes tailored to the institutional context, traffic conditions, and policy objectives of the particular city. However, more general conclusions are also drawn, including fairly low charges initially; compensating measures for groups whose welfare will decrease by the pricing scheme; a stepwise procedure characterised by adaptive learning; the negotiating abilities of politicians; a political and public discussion on the traffic problems and the general objectives of the urban transport policy; and an open communication process (102).

Finally, it should be noted that, with the exception of the Swiss scheme for trucks only, no scheme has been implemented on a national basis. In this context, Grieco and Jones conclude it is probably the case that, ceteris paribus, local schemes and developments have a better chance of success as the education and participation of a discrete and defined section of the public is more easily accomplished than gaining national acceptance for a national scheme. Thus the piecemeal introduction of road pricing may very well be a necessary first base before any comprehensive national scheme can be achieved (035).

Gaps in understanding prompting suggestions for future research:

- Comparative analyses of successful and unsuccessful schemes in order to identify both common and site specific factors
- A more methodical understanding of what may constitute ‘best practice’ in terms of road pricing policy making and implementation

Concluding Commentary

The review of material identified within the Research Compendium has served to highlight a series of issues across a number of topic areas. For each topic area research needs have been identified, and the priorities are listed at the front of this report. The review has been extensive in its coverage, and serves to highlight a range of areas where greater knowledge and understanding is required in order to enhance the quality of the public debate on road pricing.

Key issues with regard to research gaps and suggestions for future research are summarised or restated below:

i. Public attitudes with regard to revenue hypothecation, and particularly for inter-urban and national schemes.

ii. The attitudes of drivers on the monetary values they attach to reducing congestion.

iii. The values attached by drivers to various dimensions of time in their evaluation of road pricing schemes.

iv. The demand sensitivities of drivers to variable pricing schemes.

v. The attitudes of drivers on the interrelationships and trade-offs between road pricing schemes and traffic diversion.

vi. Insights into combining effectiveness and acceptability in road pricing schemes.

vii. The dynamics of how public attitudes are formed over time, such as the motivations to acquire knowledge.

viii. The interrelationships between knowledge acquisition and the shaping of ideas and opinions, for both policy makers and the wider public.

ix. How policy debates and perceptions on road pricing may be shaped by the media and public information campaigns.

x. How people acquire knowledge about implemented road pricing schemes.

xi. Identifying types of social norms that may determine public attitudes to road pricing.

xii. The links between stated purposes of road pricing schemes and the development of public attitudes.

xiii. The potential for the design and presentation of possible road pricing schemes that may maximise the number of 'winners.'

xiv. The dynamics of the interrelationships between the actual use of road pricing schemes and the formation of attitudes of those who use them, as well as the development of attitudes of those who decline to use them.

xv. The underlying reasons for contrasting attitudes to road pricing between geographical areas, such as different towns and cities, inner city and suburban areas, and those who live in rural areas.

xvi. Comparisons of underlying values and perceptions towards road pricing of both car users and non-car users.

xvii. Comparisons of socio-economic factors and social norms as determinants of attitudes and behaviour on road pricing.

xviii. Determinants of contrasting perspectives brought about by institutional factors, such as between elite stakeholders and the wider public.

xix. A greater knowledge and understanding of the configuration and dynamics of the networks of interests that surround the road pricing issue.

xx. A greater knowledge and understanding of the configuration and dynamics of the interrelationships between different levels of government.

xxi. Examinations of the role of leadership in influencing the direction of the policy process.

xxii. A mapping of the principal interests involved in the road pricing debate, and analyses of their policy dynamics.

xxiii. A greater understanding of the links between the development and efficiency of types of road pricing technology, and their ease of public use.

xxiv. Insights into the dilemma of matching road pricing technologies to local needs and circumstances, with the need for technological harmonisation.

xxv. Adapting road pricing technologies to public and political attitudes on matters of equity and fairness.

xxvi. The possibilities for integrating road pricing schemes with the development of motorist information systems.

xxvii. Adapting road pricing technologies to public and political attitudes on matters of privacy.

xxviii. A greater understanding of the different perceptions of fairness amongst the range of stakeholders, and how these may be incorporated into scheme design.

xxix. The interrelationships between public perceptions of fairness and the allocation of pricing revenues.

xxx. A greater understanding of how perceptions of freedom may be connected to those of fairness.

xxxi. Representative surveys of business attitudes to road pricing which compare organisational effects by economic sector, size and location.

xxxii. Analyses of underlying business attitudes, on how the effects of road pricing schemes may be mitigated in order to maximise the number of business 'winners.'

xxxiii. Longitudinal studies designed to discover how business knowledge and attitudes to road pricing may shift over time.

xxxiv. A greater understanding of the structure and dynamics of national and local business networks, in terms of their contribution to the road pricing debate.

xxxv. Comparative analyses of successful and unsuccessful road pricing schemes, in order to identify both common and site specific factors.

xxxvi. A more methodical understanding of what may constitute 'best practice' in terms of road pricing policy making and implementation.

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Annex A – Review Methodology

Overview

The aim of the review was to identify completed research, together with ongoing work, on attitudes to road pricing. This was to cover attitudes of both the public and business, and include attitudinal research undertaken in other countries. Coverage was not limited to academic research, provided that it fulfilled the criterion of providing significant insights into the subject of the project. The review has covered around 200 reports, papers and other articles addressing research in the UK and Europe, North America, Asia and Australasia. These are now catalogued as the Attitudes to Road Pricing Research Compendium. The Compendium does not reflect a systematic and exhaustive coverage of the evidence base. However, the intention was to identify a cross-section of documents that had particular relevance for the project and provided distinctive insights. The review project has comprised three elements, namely: assembling material for the Compendium; compiling the Compendium contents; and reviewing the Compendium material. Each of these elements is described below.

Assembling material for the Compendium

Two main avenues of enquiry were pursued to identify candidate Compendium entries: a literature search, and contact with a wide range of organisations and individuals.

The Centre for Transport & Society has access to the bibliographic database 'Transport' that catalogues at an international level research concerning transport. This database was thoroughly searched, and potentially relevant documents identified and located within the database and copies obtained. 'Transport' covers published material up to March 2004. The terms "road pricing or congestion charging", "value pricing" and "tolling" were searched in the Transport database. The abstracts were scanned for content on attitudes to road pricing and those that had empirical evidence or had a high level of information about attitudes were prioritised. Subsequently, articles that were post-1990 were prioritised (see below). Further items that were considered to be of some use were also marked.

In addition, the Google search engine was used extensively to explore online resources more widely. The most fruitful term was "Public Acceptability" + "Road Pricing". This produced just over 400 results, and the first hundred of these eventually produced over 30 Compendium entries. The term "Public Attitudes" + "Road Pricing" was also helpful, and produced 331 results, which provided around 15 Compendium entries from the results. However, it was much more difficult to find useful material on business attitudes from the search engine, with such terms as "Business Attitudes" + "Road Pricing" and "Business Attitudes" + "London Congestion Charge" yielding low numbers of results and little of value for the Compendium. Searches on some specific aspects of road pricing were more fruitful, with terms such as "Public attitudes" +"London Congestion Charge" and "Public Acceptability" + "Value Pricing" yielding several Compendium entries.

An e-mail announcement and request for assistance was sent to a number of international networks of transport professionals, including the Universities Transport Studies Group (UTSG) and the International Association of Travel Behaviour Research (IATBR). Some 30 responses were received from across the world, providing valuable leads, particularly with regard to recent and ongoing research. In addition, members of the project team also contacted other potentially useful organisations and individuals. These contacts provided valuable guidance and material, and also led to other contacts.

Compiling the Compendium contents

A substantial collection of reports, papers and other articles was assembled from the contacts and searches. Given the nature of the subject in terms of policy and technological development, together with the relevance of public attitudes themselves, it was decided to focus the main efforts of the review exercise on literature produced from 1990 onwards. It was decided also to prioritise empirical over discursive articles, and UK-based articles over overseas articles. However, significant numbers of theoretical and overseas articles are included in the Compendium, where they provide insightful data and perspectives.

The design of the Compendium sought to be comprehensive, both as a record and as an analytical tool. The proforma for Compendium entries is shown below:

Attitudes to road pricing RESEARCH COMPENDIUM

Compendium ID	**Date of Entry** **Full article?**		**Restricted?** **Electronic copy?**
Project Title			
Document Title			
Reference Details			
Web Address			
Sponsor(s)			
Contact Details			
Country/Region/City			
Relevance		**Indicative Quality Score**	
Keyword(s)			
Attitudes:	Public?	Businesses?	Political?
Context:	Urban?	Inter-urban?	
Pricing Scheme:	Hypothetical?	Proposed?	Actual?
Scheme Type:	Cordon?	Area?	Route?
Issues:	Technology?	Hypothecation?	Privacy?
Evidence:	Quantitative?	Qualitative?	Review article?
Survey Details (if applicable):			
Date(s) of Survey(s):		Population(s) of Interest:	
Sample Size(s):		Response Rate(s):	
Synopsis			
Objectives/ methods			
Findings/ conclusions			
Strengths/ weaknesses			

The proforma provided a structured approach to documenting and distilling key information from the evidence base. Basic reference and contact details of an article were first recorded. A 'high/medium/low' rating was then given to the article in terms of relevance and indicative quality. The relevance rating indicates the significance of the issues addressed within the article to the review. The indicative quality score was a means to include some indication of how well articulated and supported issues were within the article and how credible any quantitative evidence might be. Some qualification of these scores was included in the last section of the proforma ('strengths/weaknesses'). In anticipation of a number of specific issues that would need to be addressed within the review, the proforma allowed an indication to be given of which issues had been addressed in an article. Where appropriate, survey details and further information on methodology were recorded. Lastly, and most importantly, key findings and conclusions were entered.

Reviewing the Compendium material

Once the Compendium included a substantive number of entries, these were reviewed, to identify the themes and coverage that were emerging. This enabled a list of main topics to be drawn up, and this now forms the main structure of this report. Under these topic headings, salient points from across the Compendium entries were collated for assessment and interpretation. An interim report was prepared for the DfT based on some 120 entries. The project requirement was not only to review research related to attitudes to road pricing, but also to make recommendations on research that might be commissioned in order to enhance the quality of the debate. Recommendations for future research are therefore incorporated into the report.

Conclusions on methodology

The key objective was to seek out relevant material that could throw light on the subject of attitudes to road pricing. The search and contacts produced a thorough coverage of English language documents from around the world. Material available in foreign languages has not been included, although much of the most suitable material will have been picked up through papers to international conferences. However, a Compendium of this type cannot hope to provide exhaustive coverage of what is a dynamic field of research and policy interest. In addition, a subject with the high salience of attitudes to road pricing inevitably produces quite regularly topical and relevant work. As progress in the field continues, therefore, future updates of the Compendium are recommended.

Ultimately, the methodology for the project sought to provide a sound basis for a thorough review of the field in order to offer guidance on attitudes to road pricing. It is believed that the approach has been successful in this aim.

Annex B - Types of Road Pricing

An assessment of attitudes to road pricing must recognise that 'road pricing' is an umbrella term for a range of specific forms of pricing mechanisms that are different in nature and purpose.

Traditional 'road user' charges

There are already a number of well-established mechanisms for charging road users. An annual flat fee ('Vehicle Excise Duty' in the UK) is paid for the right for a motor vehicle to be used or kept on the public highway. The purpose is not and could not be to manage travel demand or congestion, since the fee bears no relation to the degree to which the vehicle is used on the road network and neither does it relate to the times and places of vehicle use.

Fuel Duty does reflect usage, as consumption increases with distance travelled, but it is a relatively blunt economic instrument in terms of travel demand management. A perceived weakness for many analysts is that it poorly correlates with congestion levels, although consumption (and therefore duty paid per kilometre) does rise in congested conditions. In the UK fuel tax has not been directly linked with transport investment and as such became widely seen as a revenue stream used, in part, to support other sectors such as health and education.

In 1993 the 1992-7 Conservative administration followed the recommendation of the Royal Commission on Environmental Pollution in introducing the Fuel Duty 'escalator' as a means of restraining the rate of traffic growth. The escalator increased the rate of Fuel Duty by 5 per cent per annum above the prevailing rate of inflation. With the 1998-9 budget the subsequent Labour administration increased the 'escalator' to 6 per cent per annum, before effectively suspending the policy two years later in response to the fuel tax protests in the UK. The immediate cause of the protest was the rapid rise in crude oil prices through 2000. They followed similar protests in other states worldwide. Between 1993 and 2000 the rate of Fuel Duty was increased by around 50 per cent, although the long-term price of fuel at the pumps increased by a lower amount.

Applying a generally accepted short-term elasticity for fuel demand with respect to price[1], it is reasonable to assume that fuel consumption was 10 per cent lower in 2000 than it would have been in the absence of the escalator, mainly due to travel behavioural responses rather than consumer choice of more efficient cars.

Parking charges might also be argued loosely to be a form of road pricing associated, in particular, with town and city centre areas. In effect motorists are charged at the end of a period of road use. Although the charge levied bears no relation to the amount of road use for the associated journey, the nature of the charging structure may influence the overall trip rate by car, by influencing the turnover of parking acts at spaces and hence their effective market supply.

[1] Glaister, S. and Graham, D. (2000). *The Effect of Fuel Prices on Motorists*. The AA Motoring Policy Unit, Basingstoke. These authors' summary figures are -0.3 in the short run, -0.6 in the long run.

Distance-related charge

In conceptual terms, one of the most straightforward forms of road user charge to implement would be a distance or kilometre charge. In its simplest form this could represent a fixed toll per kilometre recorded using the odometer or specialised on-board recorder. However, such a toll would be entirely unrelated to congestion in its most basic form, and so for many commentators would be a less appropriate transport policy tool than Fuel Duty. However, more sophisticated distance charges could be related to the emissions performance of a vehicle, thereby taxing either noxious or climate change emissions, or both.

A distance charge was considered by the government of the Netherlands in recent years, although the initiative has not been actively pursued since the last change of administration.

Urban cordon pricing

Although still relatively uncommon, and introduced for a variety of purposes, the principle of charging a toll to enter an urban centre has developed steadily over the last thirty years, with a number of implemented schemes world wide. The first major scheme of this type was introduced in Singapore in 1975, principally as a means of reducing congestion on an island with a high population density. Originally paper based, the system evolved into an electronic toll cordon in 1998.

The first European country to adopt urban cordon pricing on a major scale was Norway, where the three largest of these schemes were introduced in Bergen in 1986, in Oslo in 1990, and in Trondheim in 1991. However, in Norway the purpose of the toll rings was originally not to reduce congestion, but to finance major road projects, and so allow them to be completed more quickly than with government funds alone. In recent years, revenues have also been used to invest in public transport. In Bergen, seven tolling stations form a cordon around the city centre, with manual operation. In Oslo, there are nineteen toll stations, with automatic vehicle identification tags also available. Unlike Bergen and Trondheim, tolls are charged throughout the day in Oslo. In Trondheim, the system was fully electronic from the outset, although in 1998 it evolved, with the city divided into six zones, and charging between zones.

The first scheme of this type in the UK was introduced in Durham in 2002. Other European cities are also examining the possibility. The Italian cities of Rome, Genoa and Florence have used 'electronic gates' since October 2001 to enforce limited vehicular access to a central zone. Although no Italian city has yet introduced road pricing, the Rome optical recognition system could be adapted to enforce a charge.

Area-wide Pricing System

The world's largest urban charging scheme was introduced in London in February 2003. The branding of the scheme reveals a key purpose of the London Congestion Charge to be congestion reduction, with the charge level set to deter a share of traffic at times of 'peak' demand[2]. Hence, it can be contrasted with the Norwegian schemes levying lower levels of charge, mainly for revenue generation. A charge of £5 per day is made on weekdays between 7am and 6.30 pm to enter into a City area of around ten square miles.

[2] From an economists' perspective the London scheme is a 'congestion charge' in that it relates two levels of demand, i.e., a) weekday and b) all other times, with two levels of charge i.e. £5 and £0. However, most economists would see an optimum scheme as relating actual traffic levels and charges much more sensitively.

The zone is policed by fixed and mobile cameras which automatically pick up vehicles' number plates. Computers match the registrations with a database of drivers who have paid in advance. Those who have not paid by midnight are fined £80. There are a number of exemptions to the charge, such as vehicles with certain alternative fuels, breakdown and recovery vehicles, motorbikes and mopeds, emergency services, taxis, minibuses and public transport vehicles. Residents of the zone receive a 90 per cent discount. Policy debate is currently ongoing into whether and how the size of the zone might be doubled by taking in Kensington and Chelsea, to the west.

Following the observed experience of London, a number of cities are now considering road pricing more seriously. The most advanced of those following the area-wide approach is Venice[3] The local authority will introduce a windscreen disk-based scheme[4] in July, although there is interest in an electronic approach for the future.[5] Despite the low levels of charge proposed, strong opposition has emerged from the traders of Mestre. However, the authority feels obliged to introduce the scheme in order to enable it to comply with the maximum levels of particulate matter pollution specified under European Union air quality directives.

Inter-urban tolling

In a number of countries, including France, Italy, Spain, Japan, South Korea and Taiwan, there is a tradition of major inter-urban roads financed by means of tolls. In Britain, the first of these types of roads, the M6 Toll, was opened in 2003. Tolls are charged during the day at a rate of £3 for cars, and £11 for lorries. This 27 mile three lane motorway, built and operated by Midland Expressway, follows an arc of the existing major road network to the north-east of Birmingham, providing an alternative to the M6 between junctions 4 and 11 (often congested but free at point of use).

Hot lanes

In the USA, there has been a widespread development of special use lanes reserved for vehicles with two or more passengers. These are known as high-occupancy-vehicle (HOV) lanes. However, it was found that a number of these lanes were under-utilised, and consequently have been developed into high-occupancy-toll (HOT) lanes. In essence, these HOT lanes allow single-occupancy-vehicles (SOVs) to pay a toll for using the HOV lanes. The objectives therefore include increasing utilisation of the HOV lanes, raising revenues to develop the transport system, and reducing congestion on the free at point of use lanes.

The first HOT lanes were opened on State Route 91 (SR) in Orange County of California in 1995. The scheme is operated by a private company, but will be returned to the state of California, which owns the land, after 35 years. The electronic tolling system allows automatic toll collection and dynamic variable pricing.

Subsequently, a number of states have developed the HOT lane concept. Perhaps the most notable of these is on an 8.5 mile stretch of Interstate Route 15 (I-15) in San Diego County. This allows solo drivers to pay to use two under-utilised reversible HOV lanes. These so-called Express Lanes are physically separated from the main lanes and operate in only one direction depending on whether it is morning or evening. Entry occurs at one point, and the entire length must be traversed before exiting. Under the FasTrak system, subscribers

[3] In addition to tourists' Venice, the administrative area includes industrial Mestre and hosts east-west road and rail trans-European routes.
[4] Free for residents and other exempted groups, €15 per month or €90 per annum for visitors.
[5] At the time of writing this scheme

are issued with windscreen-mounted transponders used for automatic vehicle identification. User accounts are automatically debited a per-trip fee. The fee is posted on changeable message signs, and can be varied every six minutes. The fee is adjusted to maintain relatively free-flowing traffic in the Express Lanes.

Electronic highway tolling

A few areas have developed electronic road pricing as a specific policy measure. For example, Highway 407 in Toronto, a major route into the north of the city, is a purpose built electronic toll road. Similarly, the Melbourne City Link, opened in 2000, provides a major electronically tolled highway to the west of the city. However, one notable feature here is the dual technology. Thus a camera based system was added to the electronic one in order to minimise errors, with the aim of enhancing equity and hence public acceptability.

The Melbourne highway was constructed as a business proposition, with tolls set to maximise revenue. In the case of two bridges in Lee County in Florida, however, variable time pricing was set in order to persuade drivers to change their time of travel.

National lorry schemes

The Swiss national distance-charging scheme for lorries requires Swiss-registered hauliers to fit an on-board unit which records distance-travelled data on a chip card for subsequent upload to a billing system[6]. The on-board device is switched on or off at the Swiss border by a microwave. Foreign-registered hauliers can opt to fit an on-board unit or take advantage of a paper-based alternative (which in practice is what nearly all foreign operators have done).

In Germany, an electronic national charging scheme for lorries on motorways was due to be implemented in 2003, but because of problems with the tolling technology was postponed until 2004. Similarly, a distance based national lorry scheme for vehicles over 3.5 tonnes is due to be introduced in the UK in 2007. Linked to this, there are to be reductions in Fuel Duty and/or Vehicle Excise Duty for lorries.

[6] A paper-based alternative exists for the large majority of foreign-registered lorries which are not fitted with on-board units.

Annex C – Tabulation of Surveys' Results

The Table running over the following series of pages is a collation of the results from 24 separate surveys that included investigation of public attitudes to road pricing.

Ref	Population of interest	Sample size	Year	Proposition	strongly support	support	neutral	oppose	strongly oppose	don't know
185	Adults in Great Britain	1850	2004 Mar	Rather than build more roads each time congestion becomes a problem, I would prefer to reduce congestion by introducing direct charges for using the existing roads		38	-		52	-
				If direct charging was introduced in my area and more people wanted to use public transport as a result, I think the present transport system could cope with the extra users		23	-		66	-
				It would be acceptable for some information to be held on where drivers have travelled, so long as there were laws preventing it from being used for any other purpose than working out how much people had to pay		62	-		29	-
				It would be acceptable for some information to be held on where drivers have travelled, so long as this was held by an independent body and not to the government		49	-		38	-
				There are no circumstances under which I think it would be acceptable for information to be held on where drivers have travelled		36	-		52	-
107	Leinster residents, Dublin	1200	2003	pay a toll to drive their car into Central Dublin during certain hours if it cut down on congestion and traffic jams	8	16	14	9	50	3
				pay a toll to drive their car into Central Dublin during certain hours if it cut down on congestion and traffic jams **and if the money was used to improve public transport**	10	22	21	8	35	4
21	London residents	d/k	2003	London congestion charge		50	-		30	-

Ref	Population of interest	Sample size	Year	Proposition	strongly support	support	neutral	oppose	strongly oppose	don't know
79	UK -regular drivers	1000	2003	the tax disc should be abolished in favour of charging by how much you use the roads		56	16	26		-
				I oppose any technology that allows anyone to monitor the movements of my vehicle		57	16	25		-
				Introduction of satellite tracking and charging systems: **all the money raised was spent on improving roads**		58	16	22		-
				Introduction of satellite tracking and charging systems: **there was a permanent reduction in road tax or fuel duty**		57	14	25		-
				Introduction of satellite tracking and charging systems: **all the money raised was spent on public transport**		49	19	28		-
				Introduction of satellite tracking and charging systems: **complete confidentiality of information was guaranteed**		43	22	30		-

Ref	Population of interest	Sample size	Year	Proposition	strongly support	support	neutral	oppose	strongly oppose	don't know
184	British adult population	1850	2003 Jul/ Aug	I would rather put up with congestion than pay a charge		43	-		48	7
				There should be tolls on the use of new roads		40	-		54	6
				There should be tolls on the use of roads that have been widened		30	-		64	6
				I (would) support congestion charging in my area/support congestion charging in London		33	-		63	4
				I would support congestion charging **if other motor taxes were reduced**		58	-		37	5
				I would support congestion charging **if the money raised was spent on buses**		58	-		38	4
				I would support congestion charging **if public transport was improved first**		67	-		29	4
				The congestion charge has been good for London		47	-		17	36
	London sub-sample of above			The congestion charge has been good for London		63	-		30	7
184	British adult population	1850	2003 Mar/ Apr	If the money were used to provide alternative ways of getting around it would be alright to increase the cost of motoring through taxation		61	-		34	5
				Charging to drive in town centres is a fair way to reduce traffic		51	-		45	4
				Charging to drive on motorways is a fair way to reduce traffic		32	-		64	4

Ref	Population of interest	Sample size	Year	Proposition	strongly support	support	neutral	oppose	strongly oppose	don't know
051	GB regular drivers	1000	2002 Oct	Introduction of a fixed congestion charge for driving in central London	12	20	21	18	21	
				Introduction of a satellite tracking and charging scheme for cars	4	11	17	21	39	
173	British drivers	1084	2002 Sep/ Oct	Policy option: continuing to pay through road tax/fuel tax	28	34	-	10	14	-
				Policy option: paying less if you do not use busy motorways and areas at busy times	34	28	-	10	15	-
				Policy option: pay to use alternative congestioned roads/lanes	17	28	-	13	25	-
				Policy option: a system which monitors car use with charges for miles travelled and higher charges for busy routes/peak times	15	21	-	13	39	-
015	Edinburgh residents	12492	2002 Jun/ Aug	single charging cordon for Edinburgh with city-based improvements	51		-	38		-
				double charging cordon for Edinburgh with regional improvements	44		-	46		-
				no charging; limited improvements	39		-	43		-
015	Non-Edinburgh residents	6288	2002 Jun/ Aug	single charging cordon for Edinburgh with city-based improvements	38		-	49		-
				double charging cordon for Edinburgh with regional improvements	23		-	67		-
				no charging; limited improvements	53		-	27		-

Ref	Population of interest	Sample size	Year	Proposition	strongly support	support	neutral	oppose	strongly oppose	don't know
154	UK Principal drivers	500	2002 Mar	In the future would you be prepared to pay tolls to drive in city centres?		43	-		55	-
				In the future would you be prepared to pay tolls to drive on motorways?		43	-		57	-
				In the future would you be prepared to pay tolls to drive on all roads?		16	-		84	-
				Would road tolls be acceptable **if there was an equivalent reduction in the tax disc**?		73	-		20	-
				Would road tolls be acceptable **if there was an equivalent reduction in fuel duty**?		76	-		16	-
				Would road tolls be acceptable **if there was an equivalent reduction in public transport fares**?		65	-		24	-
				Would road tolls be acceptable **if the level was in accordance with the level of congestion**?		54	-		35	-
				Would road tolls be acceptable **if roads were improved to guarantee better journey times**?		71	-		22	-
025c	General public (aged 16+), England	1725	2002 Feb/ Apr	with the aim of significantly reducing congestion, there would be a charge for driving on congested roads at peak times, and no charge for driving off-peak.	8	21	13	20	34	4
				congestion charging as above **if all revenues raised would be returned to the road user through cheaper petrol**	20	34	17	13	12	4
				congestion charging as above **if all revenues raised would be returned to the road user through lower road tax**	20	36	16	12	11	4
				congestion charging as above **if all revenues raised would be used to improve public transport**	24	34	15	13	10	3
111	principal car drivers, UK	1084	2002	paying to use alternative uncongested roads/lanes	17	28	17	13	25	-

Ref	Population of interest	Sample size	Year	Proposition	strongly support	support	neutral	oppose	strongly oppose	don't know
025b	General public (aged 16+), England	2202	2001 Jun/ Jul	charges be introduced for drivers who want to drive into the centre of large towns and cities where there is major congestion	12	25	14	19	28	3
				as above but **with the revenue generated solely being used to make significant improvements in local public transport**	21	33	13	14	16	3
				to introduce toll charges at certain times of the day for particularly congested sections of the motorway (drivers would be notified as they approached a charging zone and given the motorway junction to leave if they wished to do so)	8	21	13	22	33	3
				motorway tolling schemes operating at certain time of day **combined with a reduction in the price of petrol**	15	37	15	14	13	5
				motorway tolling schemes operating at certain time of day **combined with abolition of VED**	17	34	16	13	14	6
				motorway tolling schemes operating at certain time of day **combined with the revenue generated being used to make significant road or public transport improvements in the area**	18	36	14	13	14	5
025b	General public (aged 16+), London	490	2001	charges be introduced for drivers who want to drive into the centre of large towns and cities where there is major congestion	16	26	16	17	20	6
				As above but **with the revenue generated solely being used to make significant improvements in local public transport**	23	30	17	12	11	7
				to introduce toll charges at certain times of the day for particularly congested sections of the motorway (drivers would be notified as they approached a charging zone and given the motorway junction to leave if they wished to do so)	9	28	17	21	19	6

Ref	Population of interest	Sample size	Year	Proposition	strongly support	support	neutral	oppose	strongly oppose	don't know
025a	General public (aged 16+), England	2024	2000 May/ Jun	charge for driving into city centres		27	-		53	-
				charge for driving into city centres and **reduce VED/fuel duty**		41	-		35	-
				charge for driving into city centres and **invest in public transport**		39	-		41	-
				charge for motorways/roads		13	-		71	-
				charges for motorways/roads and **reduce VED/fuel duty**		27	-		50	-
				charge for motorways/roads and invest in public transport		22	-		59	-
				increase the price of petrol		7	-		80	-
012	General public, West Midlands conurbation	2500	2000	charge for driving into centres	8	21	10	34	27	-
				motorway tolls	5	16	12	35	32	-
				workplace parking charges	5	10	11	37	37	-
023	Edinburgh Citizens' Panel	1150	1999 end of	road user charges, significant improvements	40	25	10	14	12	
				workplace parking charges, limited improvements	18	48	15	11	7	
				no new charges	17	19	25	33	16	
023	Edinburgh City households	19000	1999 end of	road user charges, significant improvements		62	-		32	6
				workplace parking charges, limited improvements		53	-		38	10
				no new charges		28	-		64	8

Ref	Population of interest	Sample size	Year	Proposition	strongly support	support	neutral	oppose	strongly oppose	don't know
024	Greater London residents	2100	1999 Mar/ Aug	daily charge of £5 would be a "good thing" for London		53	11		36	-
				road user charges in Central and Inner London (a £5 charge in Central London and a £2.50 charge in Inner London) if the revenues raised from charging were spent on a mix of transport improvements		67	-		26	-
				as above if the revenues raised from charging were spent on a mix of transport improvements (**respondents' spending package preferences**)		73	-		19	-
036	General public, Newcastle	219	1998 Sum-mer	road user charging	18	31	8	12	31	-
				Road user charging **without** guaranteed revenue allocation	16	32	6	15	31	-
				Road user charging **with** guaranteed revenue allocation	20	36	8	16	20	-
036	General public, Cambridge	427	1993	road user charging	12	24	10	18	36	-
				Road user charging **without** guaranteed revenue allocation	11	22	11	19	37	-
				Road user charging **with** guaranteed revenue allocation	22	29	12	14	23	-

Ref	Population of interest	Sample size	Year	Proposition	strongly support	support	neutral	oppose	strongly oppose	don't know
071	General public, Germany	1022	2001	use pricing to solve the urban traffic problem	10		-	82		-
153	Bergen/Oslo/Trondheim residents	756	2001	Tolls should be raised as and when congestion in towns and cities gets worse	8	24	12	38	18	-
				Some congestion is inevitable but tolls should be set high enough to keep it within acceptable limits	8	24	14	39	16	-
				Private motor cars should be charged more than other types of vehicles as they are the main cause of traffic congestion	7	20	10	43	19	-
				Charges should be increased during the morning peak-period above the uniform rate for the rest of the day	10	27	12	34	18	-
				Road users should only pay tolls when they cause congestion inside the toll ring	3	8	32	34	23	-
011a	car users in six European cities	1459	1998	cordon pricing	4	12	-	32	52	-
				distance based pricing	3	7	-	32	58	-
				congestion pricing	3	11	-	32	54	-
				charge motorists a fee for driving in the inner city" and use this money to provide: much better quality and cheaper public transport, plus measures to improve the urban living conditions, plus better facilities for pedestrians and cyclists	17	27	-	24	32	-

Ref	Population of interest	Sample size	Year	Proposition	strongly support	support	neutral	oppose	strongly oppose	don't know
001a	Adults in Southern California who travel on freeway during rush hour	1743	1997	base proposal: a fee of 5 to 10 cents per mile (depending on current congestion levels) was to be levied on all freeways in the region	15	23	-	17	40	6
001a	Adults in Southern California who travel on freeway during rush hour AND who SUPPORT base proposal	662	1997	base proposal **with a proportion of revenues used to reduce other taxes**	88		-	10		2
001a	Adults in Southern California who travel on freeway during rush hour AND who OPPOSE base proposal	976	1997	base proposal **with a proportion of revenues used to reduce other taxes**	20		-	74		6
027	randomly selected respondents in Oslo and the surrounding area	1100	1989 Nov	Oslo Toll Ring (Inbound traffic is tolled 24 hr a day, 365 days of the year)	28		-	65		-
			1990		34		-	60		-
			1991		36		-	57		-
			1992		39		-	56		-
			1993		38		-	56		-
			1994		41		-	54		-
			1995		40		-	55		-
089	drivers in Osaka City	356	1993	Introduction of cordon charge:	35.8		-	40.8		