

# **A Politician's Guide to Efficient Pricing**

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## Introduction

The reform of transport taxes to ensure that transport users are faced with *efficient prices* – neither more nor less – is arguably the single most important transport-sector reform currently on the agenda of OECD governments. Quantitatively, it is indeed one of the most important reforms being considered in *any* sector. For the three largest member states of the EU, the results of the research programme reported in ECMT (2003) estimated that efficient pricing for all modes of inland transport would deliver welfare gains of over €30 billion per year and revenue gains of over €100 billion per year.

Important progress toward efficient pricing has been achieved in recent years. At a policy level: in 2003, the Transport Ministers of the ECMT member-countries endorsed the long-term aim of marginal social cost pricing and agreed that near-term changes “should always move in the direction of improving efficiency”<sup>1</sup> – a position reiterated at subsequent Ministerial Councils.<sup>2</sup> In 2004, the UK Government announced in its White Paper on *The Future of Transport* its intention to commence preparation for a national road pricing system to be introduced at or after 2014.<sup>3</sup> And in 2005, the Netherlands Government announced its intention to introduce nation-wide kilometre charging by 2012 on condition that the system’s operating costs could be brought down to no more than 5% of revenues.<sup>4</sup>

Moreover, action by both local and national governments is creating irreversible facts on the ground.<sup>5</sup> Singapore has long provided a successful example of comprehensive road-user pricing. In Europe, local congestion charging systems are now operating successfully in London, Stockholm and elsewhere – and so too is the per-kilometre charging system for trucks in Switzerland. In the US, the recent past has witnessed *inter alia* an effective increase and differentiation of charges on the tolled crossings into Manhattan<sup>6</sup> – and the near future is likely to witness an extension of value-pricing initiatives in urban areas as well as on highways.

These charging systems are all designed to manage road capacity better and not simply to recover road expenditures. Austria and Germany have also introduced electronic truck km charges but these systems were introduced essentially to improve cost recovery.

In moving forward from the progress achieved to date, Ministers and other key decision-makers in the transport sector need a reliable document that can provide short and simple answers to the *main* questions in their minds. This paper – a short text in a Q & A format – aims to meet that need.

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1. ECMT (2003).

2. See ECMT (2004a) and ECMT (2005).

3. See DfT (2004a) and DfT (2004b).

4. See Werther (2006).

5. See ECMT (2004b) for a check-list of systems operating in Europe, the US and across the world.

6. See Zupan & Perrotta (2003), for a summary of the current state of play in New York – where 22% of vehicles coming into Manhattan are already paying a toll, that is to say, roughly double the number of vehicles paying the congestion charge to come into Central London – and an exposition of alternative scenarios for the further development of congestion charging.

## 1 The rationale

### 1.1 Why pricing, why transport?

Q1: Economists are always preaching the virtues of pricing. But they can't seem to do it without reports that run to the length of the Memoirs of Saint-Simon. What is the case for pricing in three simple sentences?

A: At any given time, our general welfare is maximised when the price we pay for consuming a product – each good or service or trip by road, rail and air – is equal to the additional cost it imposes on all: in the jargon, its “marginal social cost”. When prices are either above or below this point, the gain to the winner – the producer in the former case, the consumer in the latter – is less than the loss to the rest of society. So when we move from inefficient to efficient pricing, there is a net gain to society as a whole.

Q2: Yes, but we don't live in a perfect world, do we? It's not as if each product outside the transport sector is priced perfectly efficiently.

A: No, real-world markets are not perfect. In the UK, for example, prices across all sectors are, on average, 20% above marginal costs.<sup>7</sup> But this average is, in large part, the result of monopoly power exerted in a small number of markets where competition authorities intervene from time to time to correct excesses. For most markets, competition, supported by appropriate laws and effective monitoring, can be expected to ensure that the deviation of prices from marginal cost is not so large as to justify the costs of direct government intervention on continuing basis.

Q3: So why should we aim for “efficient pricing” in transport?

A: Transport is one of a small number of sectors where the market, unaided, would generate *very* large deviations of prices from marginal costs. Hence, we *do* intervene in transport markets with a battery of subsidies and taxes in an attempt to correct these deviations. The problem is that current subsidies and taxes are delivering the wrong prices. Thus, prices paid by road users in the UK are, on average, less than 50% of marginal costs.<sup>8</sup>

Q4: Yes, but my job is to deal with practical problems, perceived as such. The problems that concern voters are traffic jams and unreliable journeys, local pollution and climate change – not “inefficient pricing”.

A: Quite so. But these are, demonstrably, a consequence of the underlying problem of inefficient pricing – in particular, the under-pricing and hence over-consumption of scarce road space in urban areas. What economists do is put numbers on the problem: setting out the price changes required to solve it and the welfare gain to be had from doing so.

### 1.2 Congestion

Q5: Well, let's break it down a bit. I can see that deterring demand would help to reduce congestion but wouldn't building new roads be an alternative to pricing?

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7. See DfT (2006), in particular, Annex 1, “Theory and Evidence”.

8. See Sansom, Nash, Mackie, and Shires (2001).

A: This is just what was asked when the European Commission's Green Paper on *Fair and Efficient Pricing* appeared a decade ago<sup>9</sup> and in response to almost every national or local pricing initiative. But the fact is that tackling congestion without congestion pricing doesn't work – we have spent decades trying to do that. Most recently, two years into the UK's 10 Year Plan with its £60 billion road programme, Government was obliged to concede that, far from reducing congestion to “below current levels by 2010” as intended, the Plan's end would witness an increase in congestion levels by 11-20%.<sup>10</sup>

Q6: But why? Why would it worsen? It seems counter-intuitive.

A: Because congestion is largely the result of specific pressure points in space and time – on urban and some inter-urban routes and in peak periods – not a lack of aggregate capacity. In urban areas, the opportunity costs of allocating scarce space to additional road capacity can often be forbiddingly high; and the same applies to environmentally-sensitive space in the case of some inter-urban routes. But even when capacity expansion makes sense, there remains the problem of the peaks: eliminating peak-period congestion without peak-period pricing would require a massively wasteful over-supply. So capacity expansion tends to deliver a limited increase in the existing stock: it helps a little but it usually fails to match the increase in demand.

Q7: Well, what about using spare capacity in other modes – or adding to it?

A: So long as road use is under-priced whilst alternative modes are more or less correctly priced,<sup>11</sup> the distortion in *relative prices* will limit the contribution of these modes. To redistribute demand effectively both within the road network and from roads to alternative modes, we need accurate per-kilometre charging, differentiated by route, vehicle type and time-of-day.

Q8: You seem to suggest that investment is rather unimportant?

A: Not at all – investment is vitally important. First, we need to clear all backlogs in maintenance and renewals and sustain the investment required to prevent a deterioration of existing capacity. Secondly, whilst pricing is the main instrument required to tackle congestion, some capacity expansion will indeed be needed to complement it. Finally, in order to sustain productivity growth in our increasingly knowledge-based economies, we will continue to need investments in projects that can deliver higher speeds in dense urban spaces.<sup>12</sup> But the point to note is that efficient pricing will alter the composition and location of the requisite investment: the capacity expansion many of the most advanced economies will need is *principally* in urban rail, especially underground rail, which can absorb the demand re-distributed from urban roads whilst making minimal claims on urban space.<sup>13</sup> To get investment right, we need to get prices right.

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9. As ESC (1996) put it: “The basic principle of any market economy is that the problem of alleviating shortages and congestion ... must be tackled from two sides ... by using prices to control demand ... [and] by making improvements in supply. It is precisely this principle which the Green Paper should stress ... instead of concentrating on demand management.”

10. See DfT (2002). For the original ambitions of the 10 Year Plan, see DETR (2000).

11. The pattern varies across and within countries. But nowhere is the deviation of prices from marginal costs for alternative modes anywhere near as acute as it is for cars and trucks: see ECMT (2003). It's also worth noting that the Sansom, Nash, Mackie, and Shires' (2001) estimate of the ratio of road revenues to marginal costs in the UK at 0.36 to 0.5 was matched by an estimate of 0.85 for passenger rail and 1.13 for freight rail.

12. See Roy (2006).

13. For a fuller treatment of this point see Roy (2005b). This is not to deny the need for an expansion of road capacity in all contexts – in particular, in the case of the emerging market economies in Europe. But for the countries at the economic centre of Europe efficient pricing is likely to reduce significantly the economic gains from additional road capacity: see for example the results in CE Delft (2002) and ECMT (2003).

## 1.3 Pollution

Q9: What about pollution, though? Surely, the answer here is technology – cleaner, more fuel-efficient cars – not road pricing?

A: Pricing facilitates the adoption of new technology; they are not alternatives. We need to speed up the conversion of the car fleet on the roads, not just at the factory gates. And one way to do this is by incorporating charges differentiated by vehicle type into a national per-kilometre charging system. We also need to ensure that increases in fuel efficiency – and hence reductions in CO<sub>2</sub> emissions per kilometre – are not offset by an increase in the kilometres actually driven. Now the fuel tax is the best instrument for tacking CO<sub>2</sub> but at present we are asking it to do too much.<sup>14</sup> By introducing a differentiated per-kilometre charge to tackle all *other* costs, we can lower the level of fuel tax *and* make the overall package more effective in protecting the environment. The result will be a reduction in vehicle kilometres, fuel consumption and CO<sub>2</sub> emissions at the same time as an improvement in economic performance.

## 2 The results

### 2.1 De-congestion

Q10: Well, road pricing does seem to make good sense in theory. But are you sure you can deliver the results on the ground?

A: It is difficult to think of any other policy proposal that has been as extensively and robustly researched as this. Besides, there are plenty of systems up and running that have already delivered results on the ground.

Q11: Yes, remind me again of the results from London.

A: The Central London Congestion Charging Scheme<sup>15</sup> is a daily charge on cars, vans or lorries driven or parked within the charging zone during the charging hours. Introduced in February 2003, it has delivered *inter alia*:

- A reduction of around 30% in the overall level of congestion;
- A reduction of 27% in the entry of potentially chargeable vehicles into the charging zone in 2003 – 33% in the case of cars – and a further small reduction of 2% in 2004;
- A reduction of 25% in potentially chargeable vehicle-kilometres driven within the zone in 2003 – 34% in the case of cars – and a further reduction of 6% in 2004.

Q12: And what happened to all the motorists who were priced out?

A: The great majority were priced into other modes. Of those who switched modes, 50% switched to London Underground or national rail, 40% to buses. The reduction in the number of *people* entering the charging zone, as distinct from *vehicles*, was only 5,000 – a very small number when compared to a Central London daily population of more than 1.5 million. In short, people were not priced out. Neither, therefore, was economic activity.

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14. For argument and evidence on this point, see ECMT (2006).

15. What follows draws on TfL (2003), TfL (2004), TfL (2005) and Roy (2004).

Q13: But if it's so successful, why can't we duplicate the London scheme elsewhere instead of investing in a complex, high-tech national system?

A: In Central London, the blunt instrument of a flat-rate charge using camera technology worked well because the problem itself was so blunt: all-day congestion, at very high levels. Moreover, the pre-existing level of public transport provision, coupled with the powers and resources to provide a significantly improved bus service, sufficed to accommodate the modal shift. In most urban contexts, we will need to use a more finely differentiated charge and hence a more sophisticated technology. And we will need to ensure that the resources are available to provide sufficient public transport alternatives.<sup>16</sup>

## 2.2 Environment

Q14: I presume that the London scheme made much less of a contribution to environmental protection? But that was not its purpose, was it?

A: It's quite true that the focus of the scheme was on reducing congestion. But it has also led to a significant reduction in environmental damage. The recorded change in NO<sub>x</sub> and PM<sub>10</sub> emissions was 16%: of this, 12 percentage points can be attributed to the scheme itself – to the change in the volume and speed of traffic resulting from congestion charging – and 4 percentage points to improved vehicle technology. The scheme has also delivered a 20% reduction in CO<sub>2</sub> emissions, the direct result of a 19% reduction in fuel consumption, itself the result of the overall reduction in vehicle kilometres.<sup>17</sup>

Q15: These are impressive numbers. But isn't this the temporary result of a double whammy, the introduction of the new congestion charge without a reduction in fuel tax? Surely the effect will be reduced when the fuel tax is lowered as part of your comprehensive road pricing system?

A: Not so. If the fuel tax is recalibrated to focus exclusively on the problem of CO<sub>2</sub> emissions, this does not mean that the overall price of road use in Central London will fall. It simply means that the congestion charge, incorporated into a differentiated per-kilometre charge, will rise. Of course, in many rural and peripheral areas motorists are now paying more than the costs they impose; here, prices would fall<sup>18</sup>. At an *aggregate level*, a switch to efficient pricing will trigger a reduction in vehicle kilometres, hence fuel consumption, hence CO<sub>2</sub> emissions.<sup>19</sup>

## 2.3 Productivity

Q16: OK, so we cut congestion and emissions. But are you quite sure that higher prices for road use will not have any adverse effects on the economy?

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16. For a fuller statement of the argument, see Roy (2005a).

17. For evidence on emissions reductions from road pricing elsewhere, see ECMT (2007 - forthcoming).

18. The road wear and tear, congestion and environmental costs associated with driving on rural roads are often much lower than the fuel tax paid. Hence, the fixed costs associated with providing roads are better addressed through fixed charges than through variable charges such as fuel tax or km charges. On heavily congested networks, a variable charge for congestion may result in full cost recovery without recourse to fixed charges.

19. The detail of the pattern will vary across countries and the aggregate results drawn from highly-urbanised, densely-populated countries such as the UK and the Netherlands will not apply everywhere across Europe. Nonetheless, our research results show that even in Finland efficient pricing will deliver a reduction in vehicle kilometres and concomitant reductions in air pollution and CO<sub>2</sub> emissions: see ECMT (2003).

A: Yes, providing two conditions are met, efficient pricing can only improve economic performance. Decongestion, and the higher speeds and greater reliability that it brings, will increase productivity and hence, other things being equal, economic growth.

Q17: So what are these conditions?

A: The first is that we do not price out people when we price out vehicles. In practice, this means a sufficient provision of public transport alternatives.<sup>20</sup> As noted, London met this condition. So too has Stockholm: the reduction in road traffic in the Stockholm charging zone has been attended by an increase in public transport ridership – on the Underground, local trains and buses – and retail activity in the city has risen, not fallen.<sup>21</sup> If this condition is not met and large numbers are priced out, de-congestion would still deliver higher productivity – but it may well be attended by a lower level of economic activity.

Q18: But what about road freight? Where's the alternative in towns and cities? How do you avoid a decline in activity?

A: The answer is in the evidence from Switzerland: higher productivity in the road freight industry itself. The Swiss Heavy Vehicle Fee,<sup>22</sup> which entailed a 20% overall increase in the price of road freight per vehicle kilometre, helped to trigger an 18% increase in productivity. Part of this was due to the increase in the permitted weight limit introduced at the same time as the Fee. But the greater part is attributable to the new pricing regime, which induced a higher level of operational efficiency in terms of choice of vehicle, improved logistics, avoidance of empty runs, and so on. As a result, *the same level of ton kilometres* is now being carried by *significantly fewer vehicle kilometres*.

Q19: And the second condition?

A: The second condition is more subtle. It does not apply to the systems in Central London or Stockholm or any other centre whose core economic functions cannot be readily duplicated elsewhere. But for comparable economic centres, especially those at close distance to one another, there is some risk of businesses relocating from the centre that initiates pricing to those that do not. It is a classic case of game-theory: whilst each would gain from the game if all were to play, any one may lose by playing if others refrain from doing so.<sup>23</sup> The answer is to initiate pricing in a sufficiently co-ordinated manner, ideally in the form of a comprehensive national system. The Netherlands and the UK, having previously placed their hopes on local initiatives, have taken the right decision in opting for a national system.

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20. There are of course other alternatives: for example, car-sharing. As yet, however, it is not clear how large a contribution this could make. In the case of the Central London scheme, it has been a very small part of the story accounting for around 1,000 of the 65,000 fewer car movements, or 1.5% of the total reduction. See TfL (2004).

21. See Stockholm Stad (2006).

22. See ARE (2004) and Balmer (2004).

23. See Roy (2005a).



## 2.4 Revenues

Q20: What about the impact on revenues? Economists like to calculate the gains and losses in welfare. But we need to do our budgets in real money.

A: It's true that efficient pricing delivers large gains in welfare. The best estimate from European research<sup>24</sup> shows welfare gains of around €10 billion per year for France and Germany and €17 billion per year for the UK (£11 billion per year converted at the prevailing exchange rate). Subsequently the UK Government's own research, despite several differences in the detail of scope and methodology, produced a remarkably similar estimate of the welfare gain for the UK: £10-12 billion per year.<sup>25</sup> But what is also true is that these welfare gains are matched by large gains in net revenues.

Q21: And what are these large revenue gains?

A: There is a greater variation in revenue gains between the various countries. But if we take the UK, where we can cross-check against the Government's own research, we find once again very similar estimates. The European study finds a revenue gain of £13 billion per year (if we exclude revenues from correcting the price of parking). The Government study (which did not consider parking) finds a revenue gain of £9 billion per year.

Q22: But what exactly do you mean by "per year"? You don't mean forever? Surely, if pricing really does work and we solve the congestion problem, cut emissions and move to clean cars, charges and revenues will eventually fall?

A: That is true for some of the environmental components of pricing. We won't need to charge for various local pollutants when all cars are clean – though it will take a long time to get to zero CO<sub>2</sub> emissions. But congestion pricing is best seen as a market-clearing rent for scarce space: the rent will need to stay high enough to clear the market.

Q23: Well then: what do we do with these revenue gains?

A: In a word, we return them to society – in the form of economically beneficial expenditure and reductions in economically damaging taxes.

Of course, the first call on these revenues is the expenditure required to realise them: the set-up and operating costs of the new charging systems. These need to be kept to the minimum. We don't want too much of the economic gains to be consumed simply by collecting fees. Secondly, and simultaneously, we will need complementary investments in improved traffic management and public transport provision to lock in higher speeds and reliability and to avoid locking out people from urban centres. Nonetheless, the evidence suggests that the revenues corresponding to efficient prices will be well in excess of these immediate uses.

Now the new charging systems should be as *cost-effective* as possible in relation to the revenues they generate. But for all uses of the new revenues – the setting-up and operation of the new systems, complementary transport investments, investments further a-field or reductions in taxes – the most important test is the *cost-benefit* test: to ensure that the chosen uses maximise the net benefit to society as a whole.

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24. See ECMT (2003).

25. See DfT (2004a) and DfT (2004b).

### 3 The politics

#### 3.1 The rumour and the evidence

Q24: OK, so let's say that pricing is a smart idea, it will cut congestion and cut emissions, it will be good for the economy and good for the environment. But there is one hurdle that economists can ignore but we politicians cannot: *public opinion*. You do concede that public opinion is against it?

A: As a matter of fact, no. The need for a concerted effort to secure public acceptability has been well understood wherever systems have been successfully implemented and wherever they are being seriously proposed.<sup>26</sup> But it is false to suppose that public opinion is and must be resistant to the idea. The evidence from polling, referenda and elections suggests otherwise.

Q25: I should like to see this evidence!

A: Perhaps the most comprehensive poll to date was that conducted by the UK's RAC Foundation.<sup>27</sup> It found that 71% of people find road pricing acceptable so long as it is introduced as part of a package of transport improvements. The first major European initiative, the Swiss Heavy Vehicle Fee, was carried by a 57% majority in the referendum prior to its introduction.<sup>28</sup> The most recent initiative, the Stockholm trial, is to be put to a vote in September and the monthly polling data suggest a steadily increasing majority in favour.<sup>29</sup> And let's recall that the Mayor of London, having won election in 2000 on a platform of introducing the Central London Congestion Charge, was re-elected in 2004, fifteen months after its introduction.

Q26: But what about all the negative polls, the dire warnings that lobbyists whisper and newspapers scream, the referenda that were lost or withdrawn?

A: Those who suggest that the settled view of public opinion will be negative falsely extrapolate from a particular moment in the play and project the result as if were the end of the game. What we detect is a definite pattern in the "gestation process for road pricing schemes".<sup>30</sup> To begin with, there is no spontaneous public demand for pricing – rather there is an increasing concern with concrete problems which we know can only be solved by pricing. Then, as the idea is explained as a solution to these problems, there is a build-up of support to the point where the idea is translated into a detailed proposal. At this point, there is a fall-off in support as various constituencies contest the detail. But "if there is sufficient steadiness of purpose to keep moving"<sup>31</sup> and the scheme is brought to fruition, we witness a renewed build-up of support. For the truth of it is that schemes that have been implemented are almost invariably popular.

Q27: Are you seriously suggesting that pricing is a winning ticket – that all we have to do is hold our nerve and choose the right moment to implement the right system and that the public will thank us for it?

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26. On this point, see in particular ECMT (2004a).

27. RAC Foundation (2002).

28. Balmer (2004).

29. Stockholm Stad (2006).

30. See Goodwin (2006).

31. Goodwin (2006).

A: Yes – so long as it *is* the right system. This means a system that is not only well-prepared and fit for purpose in an immediate technical sense but one which is part of a package of improvements that can deliver a significant measurable difference in outcomes.

### **3.2 One part of a package**

Q28: A “package” of improvements? Aha, so we do have to bribe people with sweeteners to make pricing acceptable?

A: No, it is not a bribe. As we observed at the beginning, investment cannot make good the damage imposed by inefficient pricing. But the same economic principles that mandate efficient pricing also mandate that appropriate investment is provided once prices are corrected and on the basis of the new prices. The constraint of public acceptability does not require that we make the wrong investments; it simply means that we bring forward the right investments as part of a single package of reforms.<sup>32</sup> On this point, public sentiment is at one with economic science.

Q29: Well, I can see the advantage of walking on both feet. But isn't it best to take one small step at a time: a small adjustment to pricing – and to investment – followed by another – and so on?

A: Paradoxically, a bold system that makes a significant difference is likely to prove far more of a winner than a modest system that makes little difference. People are justifiably suspicious of initiatives that promise much but deliver little. London did the right thing in imposing a charge that was high enough to cut congestion by 30% and clear 65,000 vehicles out of Central London – whilst ensuring sufficient public transport provision to prevent people being priced out of Central London. In contrast, a modest system that imposed too low a charge to make a tangible impact on the travel experience would have had little chance of securing public support.

Q30: So that's the deal? People start paying and we start spending?

A: In a word, yes. Transport users will be asked to pay the right price – no more, no less – for the costs that they impose. And governments will be asked to do the right thing by society: to apply the right price without fear or favour and to supply the requisite investment where and when it is needed.

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32. On the impact of pricing reform on the issue of the timing of investments, see Roy (2005b).

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