

# Pricing Urban Transport

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Welcome to the fifth issue of the European Transport Pricing Initiative Newsletter

## Implementing Innovative Pricing in Transport

### Purposes and Intentions of MC-ICAM

One key issue in policy discussions on transport pricing reform has concerned the role of marginal cost pricing. This pricing principle makes transport users face all the incremental costs of their use of the transport system – operating, maintenance, safety and environmental costs. The view that this principle should have an important role in practical pricing systems has over time received more support, although slowly. Partly this development has been implicit since the term marginal cost pricing is not always used, although clearly the idea has been to apply similar principles.

MC-ICAM is a research project funded by DG TREN of the European Union, which has considered various issues related to the



implementation of marginal cost and more generally efficient pricing in transport. The project has covered all major modes (urban, interurban road, rail, air and water).

MC-ICAM has focused on the implementation of so-called marginal cost based pricing in transport. This approach differs from the standard notion of marginal cost pricing in two respects.

First, prices need not be exactly equal to marginal costs (i.e. we allow for optimal deviations for example for reasons of practicability, financing requirements this principle immediately raises a number of questions concerning the optimal implementation strategy, such as:

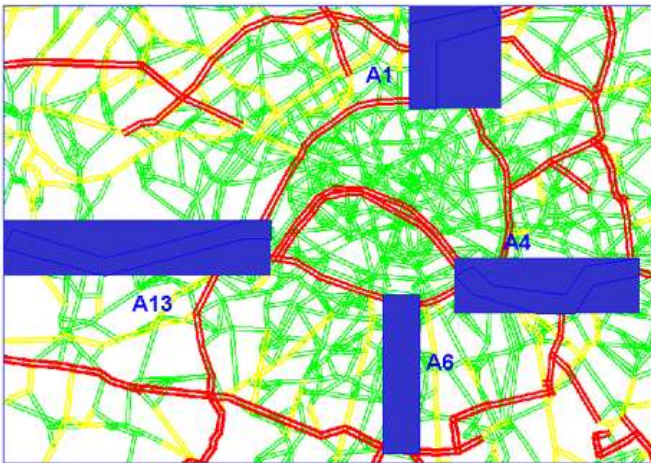
- How should the implementation steps be defined?
- Which modes or parts of the transport network do we address first?
- What accompanying measures should we undertake?
- How would the welfare effects develop or accumulate during the transition path?
- To what extent can the initial steps capture

the benefits of fully efficient pricing? Are they so good that the later steps are relatively unimportant? Or so poor that they are hardly worth pursuing?

In research, both academic and policy oriented, almost no attention has been paid to these questions. Existing empirical and theoretical analyses have typically focused on the derivation of optimal transport prices. And economists and simulation modellers when investigating the effects of these prices have restricted themselves to comparing the situation before and after the change, but have overlooked issues related to the transition path in between and the related dynamics. MC-ICAM has been concerned with these and related questions.

For more information about MC-ICAM and transport pricing issues visit [www.mcicam.net](http://www.mcicam.net)

# Road pricing: *Paris after London?*



A recent study in Paris, carried out as part of the MC-ICAM project, provides the first investigation of an academic study of dynamic road pricing on a large-scale network. Due to the novelty of dynamic pricing and the size of the area, the simulation results are still preliminary. However, the results have already important implications summarised below.

The impacts of different road pricing instruments for the Paris region have been analysed (city center and suburbs or Ile-de-France). Three policies were envisaged:

(1) link-based tolls (flat or modular, i.e. time of

the day dependent tolls), on highways A1, A13, A6 and A4,

(2) cordon tolls in and around the city centre, and

(3) distance-based tax. Road pricing is still not currently implemented in Ile-de-France (with only one exception for the highway A14), and therefore road pricing was assumed to unfold gradually as political and legal constraints permit. Note that, as for the London area, the tolls envisaged only include a small fraction of Ile-de-France.

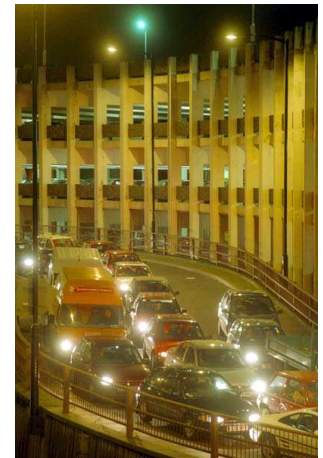
Several results from the simulations (performed with the software METROPOLIS) deserve

emphasis:

Improvements from link-based tolling are positive but modest. The reason is that only a very small portion of the road network were tolled, and at a low level in order to avoid undesirable traffic diversion of traffic to untolled alternative routes.

The cordon tolls and the distance tax yield considerably higher benefit than do the link-based tolls. The revenues collected using a cordon around Boulevard Périphérique, was about 330 millions €/year, while the average reduction of user social cost (for the whole Ile-de-France) was 6%. Note that toll revenues anticipated for the City of London are very similar (350 millions €/year).

Time of the day dependent tolls (modular tolls) appear to be much more effective than flat tolls. This is because the modular tolls have a positive impact on the peak period congestion



(which is spread by the tolls).

Acceptability constraints imply that a fraction of the toll revenue should be redistributed, for example, to improve the quality of public transportation.

Interestingly, parallel simulations were performed by MC-ICAM for the cities of Brussels, Helsinki and Oslo. These studies lead to comparable results. This new stream of research convincingly highlights the enormous potential benefits of road pricing. These results reinforce the arguments in favour of road pricing till now mainly defended by economists.



# Phasing and packaging



Despite the large and growing number of plans for using transport pricing policies to reflect, for instance, the marginal cost of congestion, the number of actual applications has remained relatively small. Apparently, the implementation of marginal cost based pricing in transport is not as straightforward as it may seem after calculating the net social benefits that can be realised with it – which should, in theory, enable the government to make everybody better off with the policy than without it. MC-ICAM has identified a large number of various types of barriers and constraints that may explain such difficulties in implementation.

One suggested solution to facilitate the implementation is gradual introduction of the relevant policy measures along an implementation or transition path and related to this phasing and packaging of the measures.

To analyse these matters thoroughly, MC-ICAM distinguished between barriers and constraints. The constraints refer to limitations on the pricing system and the measures used. The barriers instead represent factors or societal phenomena that are underlying reasons for these constraints to be true – they generate the constraints. We considered five types of constraints on pricing that could be relevant: constraints on the coverage or scope of the policy, the composition or level of prices, the degree of differentiation of prices, revenue use, and supplementary non-price policies. The various types of barriers considered include institutional, technological, and acceptability related barriers.

A key question is: Can we think of a sequence of steps that each, individually, will succeed in passing the various barriers and constraints, and that together will

take us to a final optimum (desirable end point)? Which should be the main principles underlying the design of such implementation paths, and which are the main effects compared to the do-nothing policies or an immediate full scale implementation ('Big Bang')?

The challenge in the design of implementation

rules are referred to as second-best policies. For these policies, it is often important to combine different policies in packages, as they may often be complementary in terms of their effects on the various aspects – dimensions – of behaviour of transport users. An example would be to use a combination of fuel taxes to affect the length of trips, parking



paths is to introduce policy instruments over time such that welfare is maximised, and the relevant constraints are satisfied in the least distorting way possible. Such constrained policy

policies to affect their spatial differentiation, and differentiated licence fees to affect the technology of the cars in the fleet.



# Experiences from the United States and Canada



Under recent U.S. federal legislation funding is available for innovative road and parking pricing measures to relieve congestion. Over thirty projects have been approved, with a wide range of public-private mix. Projects to toll existing roads and projects to toll new lanes are prominent, as are projects for cashing out free parking, and variabilisation of insurance and other fixed automobile ownership costs. Most toll road projects employ time-of-day pricing. On State Route 91 in Orange County (see picture) the High Occupancy Toll (HOT) lanes have tolls that vary hourly with different schedules for morning and evening peaks and for day of the week. By contrast, tolls on the HOT lanes of Interstate 15 in San Diego do not follow a timetable, but are adjusted dynamically to maintain free-flow conditions.

The U.S. focus on facility-based tolling contrasts with the use of cordons and area-based measures in Europe and Singapore. Possible contributing factors are urban sprawl and dispersal of congestion in the U.S., and difficulties in gaining political consensus. In Canada, tolling is also concentrated on single facilities. But Canada has only 1/20 the toll road mileage of the U.S., and much of it consists of toll bridges and tunnels that connect to the U.S. The most notable facility is Highway 407: a 108 km. private electronic toll highway north of Toronto. Tolls are set per km. and depend on vehicle type and time of day.

Canada and the U.S. have the largest bilateral trade flow in the world, and the advantages of interoperability are obvious. But there is no political equivalent to the European Union for harmonising transport

policy or for planning a phased implementation of road pricing. Momentum appears to be weaker in Canada because it has proportionally fewer roads with enough traffic to warrant tolling. Nevertheless, the 2001 review of the Canada Transportation Act made a strong case for new ways to finance roads and charge for their use.

## U.S. websites

*State Route 91:*  
<http://www.91.expresslanes.com>

*Interstate 15:*  
<http://argo.sandag.org/fastrak>

*Value Pricing Pilot Program:*  
<http://www.valuepricing.org>

*Texas Transportation Institute:*  
<http://tti.tamu.edu>

*Reason Public Policy Institute:*  
<http://www.rppi.org/transportation>

## Canadian websites

*Highway 407:*  
<http://www.407etr.com>

*Canada Transportation Act Review Panel:*  
<http://www.reviewcta-examenltc.gc.ca>

*Victoria Transport Policy Institute:*  
<http://www.vtpi.org>

## CUPID/PROGRESS-Update

### Road pricing meetings

PROGRESS is the DG TREN supported demonstration project for urban road user charging and CUPID is the thematic network responsible for evaluation and dissemination of the work of PROGRESS. The projects are due to be completed in 2004 and will report on the trials and demonstrations of a range of technologies and plans for road user charging in 8 European cities.

The PROGRESS and CUPID road user charging projects met in Genoa on 8-9 May for their spring consortium meetings and a visit to the equipment deployed in the latest trials of cordon pricing in Genoa. Presentations were made at the internal workshops by Bristol and Genoa on the ongoing technology trials, and by Edinburgh and Trondheim on the consultation process associated with road user charging. An external speaker, Tore Langmyhr from Trondheim presented an overview of new developments in Norway. CUPID and PROGRESS members will present the findings of the projects at a conference in London on February 24th and 25th 2004, marking the 1st year of operation of the London Congestion Charge. Further details of this and of the work undertaken by both projects can be found from [www.transport-pricing.net](http://www.transport-pricing.net).

# Pricing of Rail, Air and Water

The EC White Paper (2001), which defines the direction for future transport policy within the EU, advises a shift in the balance between modes, in particular from road to rail and water modes. Efficient cost-based transport pricing is seen as one of the measures needed to bring about this shift. Currently the pricing practices on rail, air and waterborne transport in Europe are very different, partly due to different institutional arrangements regarding ownership and regulation.

Traditionally, one vertically integrated company has provided both rail infrastructure and service provision. More recently a degree of separation in rail has occurred in order to



promote competition within rail and across modes. In air and waterborne transport, the separation of these two sets of activities has been standard practice.

The three modes are at different stages of implementation of marginal cost pricing of infrastructure. Rail is the most advanced, though frequently watered-down versions of marginal cost pricing

have been implemented, due to political, legal, institutional and acceptability barriers. The large number of tariffs that already exist in air transport are not designed to deal with the current level of demand, although some airports have already begun changes in the pricing process. Waterborne transport is the furthest from potential implementation.

As emphasised by the EC, it is important to ensure that although price levels can be different across countries, the methods by which they are computed should be similar across countries and modes (including road). Open for discussion are several major issues, including the incentives short-run marginal cost pricing can create with respect to investments in the future, privatisation versus regulation as ways of achieving marginal cost pricing and the relationship between pricing on the different modes. Scarcity costs in particular remain a priority for further research.

## London Congestion Charging – so far so good



In February London became the first city in Britain (excluding a very small scheme in Durham) to introduce congestion charging. All vehicles have to pay a charge of £5 to drive in Central London between 7.00 a.m. and 6.30 p.m. Mondays to Fridays, with certain exceptions. Buses and taxis are exempt and residents within the area can obtain a 90%

discount. Payment can be by web, mobile phone text message or over the counter at Paypoint outlets. Enforcement is by cameras linked to number plate recognition technology.

The aims of the scheme were to reduce traffic within the charging zone by 10-15%, improve bus services and raise net revenue of £130m for investment in improved transport. Initial indications are that the scheme has got off to a good start, with no major

hitches, and that the objectives are largely being achieved. There was an average reduction of traffic of 17% in the first 8 weeks of the scheme (since this is for all traffic it implies a much greater reduction in private cars of course), bus use was up 10% and traffic conditions much improved. The only real worry is that the greater than expected reduction in traffic may reduce the amount of revenue the scheme produces and thus reduce future transport investment below

the level planned! [http://www.tfl.gov.uk/tfl/cc\\_fact\\_sheet.shtml](http://www.tfl.gov.uk/tfl/cc_fact_sheet.shtml)



# Review of Pricing Reform in Transport

IMPRINT-EUROPE is a three year strategic review of transport pricing policy research with the aim of advancing the implementation of transport pricing reform. The review is funded by the DG TREN and it involves a series of six high profile, international seminars at which the needs of policy-makers and the findings of research are being synthesised and debated by European, national and local level policy-makers, academics and other stakeholder groups. Based on these debates, recommendations on how to implement fair and efficient prices will be developed. The fourth of the semi-

nars took place, alongside the MC-ICAM final conference, in Leuven in May. The theme of the seminar was phasing and packaging of pricing reform and, as such, it drew heavily on the outputs of MC-ICAM.

In addition, the seminar heard from Steve Perkins of the European Conference of Ministers of Transport who recently facilitated a meeting of the European transport ministers to debate transport pricing policy, in light of ECMT's statement on transport taxes and charges and of recent research undertaken on their behalf. A full report of the seminar will be made available in the

autumn.

The next seminar will focus on issues specific to the Newly Associated States (NAS), who are commencing the reform of transport pricing from a quite different starting point to that of the existing member states. The seminar will be held on 16 and 17 October in Budapest, hosted by the Budapest University of Technology and Economics. The intention is to look at pricing reform in the road and rail sectors, summarising the current EU situation and examining how this relates to the NAS.

Beyond that, the sixth and final seminar will

constitute the final conference of the series, to be held in Brussels during February 2004. Plans for this are underway and the intention is to devise a set of draft conclusions and recommendations based on the first five seminars, to test these with high level policy-makers and to debate the detailed issues amongst a wider group of stakeholders and academics.

*For further information please contact the Project Co-ordinator, Professor Chris Nash ([cnash@its.leeds.ac.uk](mailto:cnash@its.leeds.ac.uk)) or visit ([www.imprint-eu.org](http://www.imprint-eu.org)).*

## Interurban freight transport in the Netherlands



One of the case studies within the MC-ICAM project concerns interurban freight transport in the Netherlands. (A parallel study considered freight transport in Norway.) In this case study the SMILE model was used to evaluate implementation paths for marginal social cost pricing (MSCP) of freight transport. The model analyses the impacts of economical developments, international trade and logistic behaviour on the

transport flows in the Netherlands via different modes.

Without any policy changes (Do Nothing policy) the total transport performance (measured in tonne kilometres) increases by 55% between the years 2000 and 2020. The transport performance of all modes grows, but the modal shares of inland waterway and rail slightly increase at the expense of road transport (by 0.5% and 0.7% respectively). In absolute terms road transport accommodates most of the growth. Technological developments will lead to reduced environmental and safety cost per kilometre, but due to the increased transport total externalities still increase.

In the different MSCP implementation paths we see a 0.2% to maximum 1% lower total transport performance in 2020 compared to the Do Nothing policy. Road transport gains additional market share under all implementation paths. This is due to the fact that charging the social marginal cost for all modes results in relatively high increases of transport cost for rail and inland waterway. Another important factor is that the externalities of road transport decrease faster than those of the other modes as a result of improved technology for road transport, resulting in lower charges for road transport under the MSCP principle. Thirdly, geographical differentiation of charges makes some road transport

links cheaper, namely those through less densely populated areas.

Different degrees of geographical differentiation of charges were evaluated, depending on the population density per region. The results suggest that every step towards further differentiation creates welfare gains, which going towards full differentiation, become a bit smaller.

The revenues in the different implementation paths differ considerably. The revenues are the highest in case of undifferentiated internalisation of marginal social cost, yielding almost 50% more revenues than in the Do Nothing policy.

# Policy conclusions

(where we are and where we go)

MC-ICAM has shed light on questions related to the identification of optimal and feasible implementation paths from a current situation with non-optimal pricing (level and structure of prices) to a situation with socially optimal pricing. Given the novelty of the issues, we have developed new and innovative approaches to investigating them. And we have carried out a number of modelling case studies to test plausible implementation paths and their impacts. A key challenge for research is to further develop the conceptual approach as well as new models and evaluation techniques in order to be able to derive reliable estimates of the welfare benefits of efficient pricing in the dynamic context of policy implementation.

At the time of writing this, we are still working to finalise the policy conclusions with the aim to present an integrated view. However, among the key conclusions will be the following:

- Many problems come from the attempt

to apply marginal social cost pricing in a naïve way

- In practice, it is better to speak of marginal cost based pricing, as it may be optimal to have prices deviating from marginal costs and introduce pricing as part of policy packages

- There are good theoretical and practical reasons to believe that phasing and packaging should be an important part of implementation

- The best implementation path can be seen as a sequence of constrained optima, with the constraints determined by the barriers to pricing reform

- The technological and institutional barriers are important to consider, and they are genuine barriers in the short run, but the key barriers are related to acceptability (public, business and political)

- Deliberately distorting some prices to counter distortions elsewhere, for instance by making public transport very cheap to counter the

failure to charge road use appropriately, is a policy which should be used cautiously, because it may make reaching an optimal pricing policy overall more, rather than less, difficult

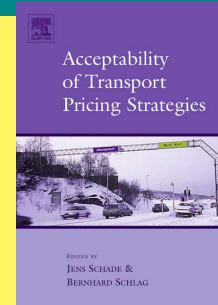
- Substantial benefits may be obtained from careful, yet simple, first steps to implementation, and successful first steps may also help increase acceptability of more sophisticated pricing measures later

- A key challenge for policymakers (and researchers) is to understand the barriers and constraints (e.g. the factors and mechanisms behind poor acceptability) and the ways in which they may be reduced or removed

More concrete results and full reports of all articles can be found at [www.mcicam.net](http://www.mcicam.net)

*Further information on MC ICAM is available from the Project Co-ordinator Dr. Esko Niskanen (Institute for Transport Studies, University of Leeds), e-mail: [eniskane@its.leeds.ac.uk](mailto:eniskane@its.leeds.ac.uk)*

## Forthcoming MC ICAM Publication



MC ICAM addressed the problem of low public and political acceptability of transport pricing strategies by conducting a high-profile conference where proceedings will be available via Elsevier. It comprises contributions from some of the most recognized psychologists, economists, civil engineers, sociologists and political scientists in the field, like, B.S. Frey, T. Gärling, P. Jones, J. Viegas, T. May, S. Proost, and other authors.

Divided into four parts, 1. Setting the Stage: Acceptability Problem, 2. European Research Results, 3. Behind Public Acceptability: Relevant Determinants, and 4. Political Acceptability, the book tackles several relevant parts from a theoretical as well as from a practical viewpoint by asking questions like:

How to explain the different levels of public acceptability of various travel demand management measures? Which factors influence the level of acceptability? How to deal with political acceptability problems? How should future implementation approaches look like from the point of view of acceptability?

Scheduled for publication in October 2003. For more information on the book see <http://www.elsevier.com/locate/isbn/0080441998>

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