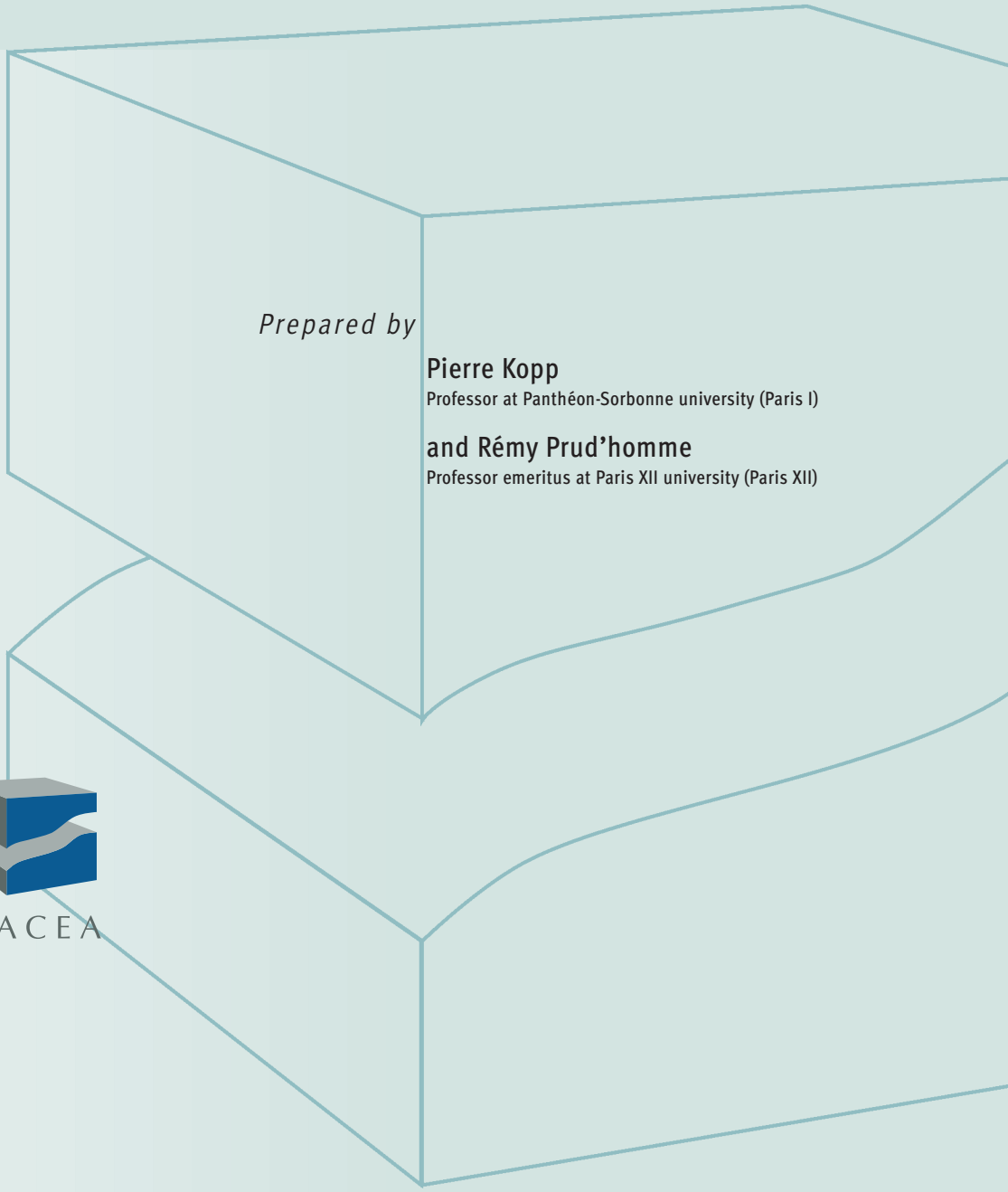
DISCUSSION PAPER - 12TH ACEA SAG MEETING ► DECEMBER 2007

The internalisation of external costs in the transportation system

Prepared by

Pierre Kopp
Professor at Panthéon-Sorbonne university (Paris I)

and Rémy Prud'homme
Professor emeritus at Paris XII university (Paris XII)



ACEA

Content

ACEA

Foreword

The ACEA Scientific Advisory Group

To overcome the shortfall of scientific understanding of some transport policy issues, the members of ACEA established a Scientific Advisory Group (SAG) in 1998, to examine important issues relating to transport policy. This report is the result of the twelfth meeting of the SAG, on “The Internalisation of External Costs in the Transportation System”, held in Brussels on 5 December 2007.

The participants in the workshop included the following:

Professor Pierre Kopp	*University of Panthéon Sorbonne (Paris I)*
Professor Dieter Shcmidtchen	*University of Saarland*
Anders Lundström	*Scania*
Manfred Buck	*Daimler*
Jean Wibaut	*GM*
Dirk Oschmann	*GM*
Maurizio Pastine	*FIAT*
Stefan Klatt	*MAN*
Francesco Massa	*IVECO*
Christian Rousseau	*Renault*
Ziad Dagher	*Renault*
Michael Niedenthal	*VDA*
Ulf Ehrning	*Volvo*
Sabine Spell	*Volkswagen*
Tom Antonissen	*ERF (European Road Federation)*
Jens Hügel	*IRU (International Road Transport Union)*
Fuensanta Martinez Sans	*ACEA*

Preface

The objectives of the meeting were:

- to evaluate the practicality of the methods proposed by the Commission in its paper for:
  - identifying the external costs and their value
  - identifying the policy instruments that could be used for the internalisation of the costs
- to investigate the effects of the internalisation of external costs on transport and economy
- to examine the question of what to do with the revenues obtained.

The Commission is currently developing a model for the assessment of external costs of transport. The European Parliament requested this when it approved the "Eurovignette" Directive in May 2006, which states that no later than 10 June 2008, the Commission should present a model for the assessment of all external costs and an impact analysis of the internalisation of such external costs.

The Commission published on 29 October 2007 a 25-page document that is presented as a "consultation document" for the "Preparation of an Impact Assessment on the Internalisation of External Costs".

Yet many questions remain unanswered about how the internalisation of external costs in transport could be moved from theoretical model to practical application.

The purpose of the workshop will be to re-examine these issues in the light of the consultation paper published by the Commission.

1 Introduction

The Commission is currently developing a model for the assessment of external transport costs. The European Parliament requested this when it approved the "Eurovignette" Directive in May 2006. For many years, the Commission has been advocating the need to internalise external costs of transport[1].

This paper is devoted to discussing the Commission's proposals as they are summarised in a recent document: "Preparation of an Impact Assessment on the Internalisation of External Costs, Consultation Document" (2007)[2].

A large consensus exists in favour of internalising external costs. The costs of transport can be divided into private/internal costs (those directly borne by the agent engaged in transport activity) and external costs (those that are imposed on others but are not supported by the users). The sum of private and external costs represents the social cost. The boundary between internal and external costs is defined by the costs that a person takes into account when deciding to use transport. This means that when engaging in transport activity, a person will incur private costs that are linked to the use of a mode of transport but will not be aware of effects imposed on others (e.g. congestion, pollution). His decision will not be based on the full social cost of his activity. The person will choose the quantity of transportation that equalises his marginal willingness to pay and the marginal cost of transportation. The latter is mainly composed of the price of the transportation trip (i.e. price of fuel, fare, amortisation of the vehicle, and the value of the time spent in transport). In doing so, the person will not choose the optimal quantity of transport, but a higher quantity. The optimal quantity of

transportation is given by the equalisation of the marginal social cost (instead of the private cost) with the marginal willingness to pay. In this configuration, the full cost of transportation (private + external) is considered by the agent and the quantity of transportation set at the optimal level.

The main external transport costs are congestion, accidents[3], pollution and the greenhouse gas effect. The other externalities (i.e. noise, damage to the biodiversity or the landscape) must also be taken into consideration. All of these costs must be internalised using the appropriate policy.

This objective cannot be reached by letting market forces play. State intervention is required to force individuals to integrate the external cost into their private cost calculation and reach the optimal. Many tools can be mobilised, the most important being:

- regulations, which can set out new standards (i.e. emission level for cars) or prohibit an activity or a behaviour (drinking while driving or driving without a seat belt)
- taxation, which increases the price paid by the consumer and drives it to the optimal level. The taxes must be exactly equal to the difference between the marginal social cost and the marginal private cost, at the optimum. If the taxation level is too high, the use of the transport system will be exaggeratedly reduced and society will suffer from a lack of transportation. Conversely, a too modest taxation would not reduce the level of externality enough
- caps and trade permits, which together form a sophisticated system where the level of externalities attributed to a country (or activity) is set at a certain level. Those who are not able to reduce their externalities to this level can buy "permits" sold by those who are over accomplishing their goals.

Primarily, when trying to apply the textbook schemes to reality it appears that some theoretical aspects are not so clear. Designing a public policy reveals many theoretical caveats and recalls that the devil lies in the details. In addition, the correct implementation of these schemes depends on the magnitude of the externalities. Estimating the level of externalities relies on sophisticated techniques such as hedonic pricing or contingent valuation. We will not discuss these techniques in depth but focus on much simpler assumptions made by the Commission, which can flaw the calculation. What is at stake is not clarification of a rhetorical controversy among specialists, but the calibration of the Commission's whole transportation policy.

1 - Green Paper: Towards Fair and Efficient Pricing in Transport, COM (95) 691.
- White Paper: Fair payment for infrastructure use: A phased approach to a common transport infrastructure charging framework in the EU, COM (98) 466 final.
- White Paper: European Transport Policy for 2010 - Time to decide, COM (2001) 370 final.

2 The document can be found on http://ec.europa.eu/transport/white_paper/consultations/index_en.htm)

3 The case of road accidents is not that clear. Road accidents are not externalities but a consequence of the traffic. This difference has theoretical and practical implications. *(see on page 14)*

2 Internalising the congestion costs

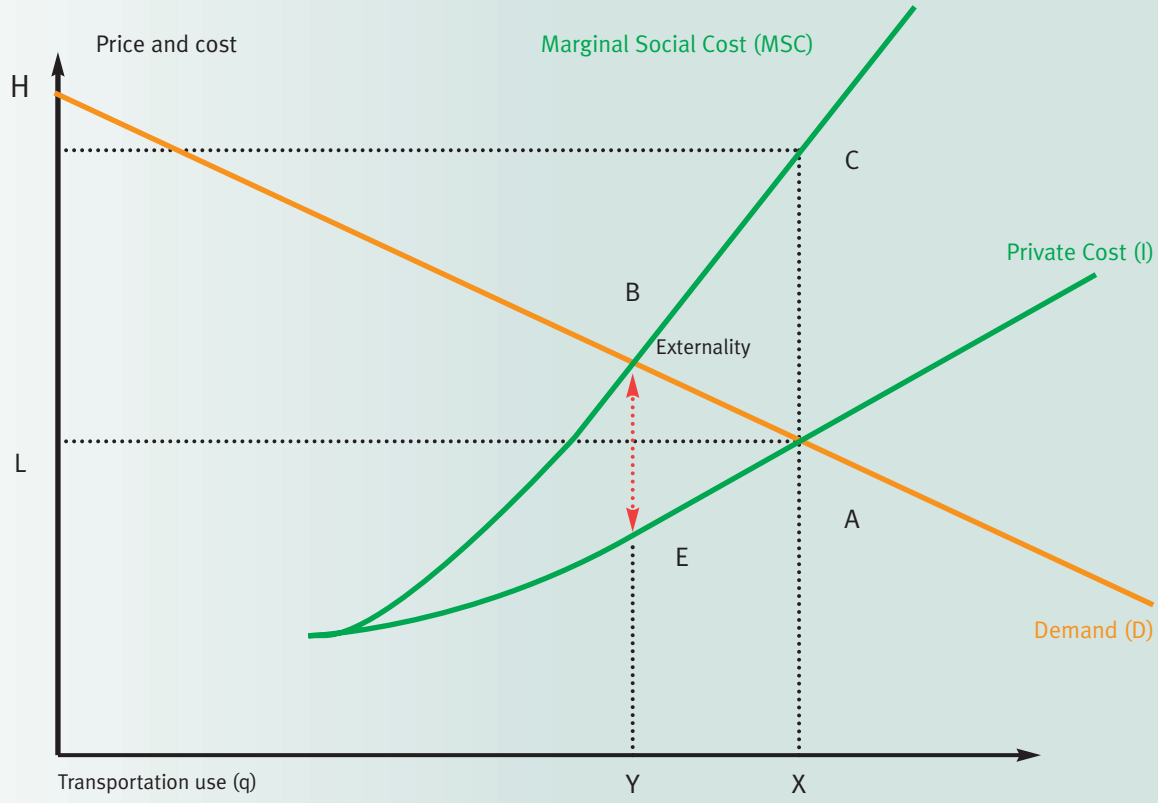
Congestion costs usually refer to road congestion. This leads to evaluating these costs and discussing the public policies devoted to their internalisation. Congestion also affects public transportation and leads to time loss and a decrease in the quality of the service. Interestingly, there are thousands of papers, studies and policy proposals on road congestion, but virtually nothing on public transport congestion. This should also be addressed by the public policy. Congestion is usually tackled using taxes (on fuel or by tolling the traffic) which decrease road usage.

Road Congestion: a Theoretical Approach

The Commission emphasises that it is widely acknowledged that the charging approach that would respond to efficient and fair principles would be the marginal social cost pricing. Such an approach means that transport prices should be equal to the short-run additional cost created by an additional user of the infrastructure.

In the figure below, the demand, or marginal willingness to pay for transportation, declines with the price (D). Curve I represents the unit cost for the individual user, which increases with road usage

MARGINAL SOCIAL COST PRICING



because of congestion, the private cost. The private cost is increased by the externality and gives the Marginal Social Cost (MSC) which also increases, faster, with road usage. Imposing a tax on road usage equal to BE would drive the quantity of road usage (X) towards its socially optimal level (Y). Congestion tolls are an illustration of this principle.

Marginal social cost pricing

According to the textbooks and as shown in the chart, the correct level of the tax must equal the amount of the externality at the optimum (BE). Marginal Social Cost (MSC) pricing leads users to reduce their road usage to the optimal level. These taxes and charges have actually been implemented in Singapore for more than thirty years and more recently in London, Stockholm, Oslo and elsewhere, but some problems still remain.

Unfortunately, most of the empirical cost calculations are done under the current situation of road usage. This means that the marginal social cost which is measured is AC instead of BE. As AC is much higher than BE this leads to over taxation of road usage and reduces it to a sub-optimal level, possibly much to the left of Y. In such a case, the cure would be worse than the illness.

To bypass this problem, assume that the externality is proportional to the road usage; the curves of private cost and marginal social cost would be parallel, AC would equal BE and the problem would vanish. Such an assumption is unrealistic because congestion, a typical externality of road usage, is a growing phenomenon linked to traffic.

According to the current level of traffic, an additional road user will slightly slow or freeze the traffic, illustrated by the slope of the marginal social cost being greater than the private cost. Marginal social cost pricing should therefore be based on the congestion level at the optimum. Such a calculation is much more complex but is indispensable for an optimal result.

Free flow versus optimum

Another problem with MSC pricing is in the position of the optimum, which the Commission states may vary between countries. The paper refers to COMPETE (2006) and cites a travel index for cities other than London where congestion is defined as the difference between the time length of a trip in free flow and during peak hours. The optimal must not be defined relative to a technical state of the traffic on the road but at the intersection of the demand for transportation and the marginal social cost. It suggests that both the demand and the marginal social cost have been calculated. Using the difference between the free flow and peak is economic nonsense and suggests that the normal status of a road is empty, which means that every car using the road would be defined as a factor of congestion.

This is why the evaluations often proposed for congestion costs should be considered with great reserve. The European Commission for a long time (notably in its White Paper of 2001) announced a figure of 2% of GDP. It now speaks of 1% of GDP. The UNITE report (Unification of accounts and marginal cost for transport efficiency) announces for France a figure of 3.5% of GDP[1]. This evaluation is greatly overestimated. Evaluations based on the economic definition of congestion costs being at X rather than at Y leads to much more meaningful, and lower, results.

On this issue, the London and Stockholm tolls offer useful data, as they have effectively reduced

congestion to more or less its optimal level. The gain in time created by the toll is a measure of the cost of congestion in these city centres. Thanks to these real-life experiences the cost is reasonably well-known.

In these two cities (or more precisely reduced zones of these cities) tolls have been introduced; their effect was not to eliminate congestion, which would be nonsense, but to reduce it to its optimal level. In London this gain amounts to around 70 million euros per year, according to the toll operator. Relative to GDP of the toll zone[2], this makes 0.1%. In Stockholm, gain amounts to 56 million euros per year according to the toll promoters, to 14 million euros according to our estimates. Relative to GDP of the toll zone in Stockholm, this makes 0.14% to 0.035%. In both cases, the estimate of congestion cost in two city centres is around 0.1% of GDP.

From these figures we could suggest an estimate of the ratio cost of congestion in European cities on GDP in Europe, which is certainly inferior to 0.1% for two reasons. The first is that it concerns the most congested zones of the country where at least one of them (UK) is one of the most congested in Europe. The ratio for the whole of the London agglomeration (or Stockholm) would certainly be lower than 0.1% and inferior to the ratio for the whole of agglomerations in the UK or Sweden. The second reason is mechanical. The GDP of the cities is inferior by 15 or 20% of the ratio of congestion costs of cities to the GDP of cities. In total the ratio of urban congestion cost to GDP of Union countries is in the neighbourhood of or inferior to 0.05%. This is twenty times less than the figure of 1% suggested by the Green Paper on Urban Mobility (2007). The first of the pillars upon which the Green Paper's analysis is thus a gross overestimation: not 20%, but twenty times.

Note that the benefits of tolling are not equal to this very real gain, which is a "gross grain". One has also to take into account the cost of operating the toll, which is significant, and the likely cost of increased public transport congestion, in order to obtain the "net gain" of an internalising toll. This net gain turns out to be small or even negative in London and Stockholm, and would probably be even smaller or more negative in most, but perhaps not all, European cities.

The London and Stockholm experiences also give us a ceiling on marginal congestion costs in Europe. They are given by the actual optimal tolls, which were equal to about 7 € in London and 1 € in Stockholm. There must be very few, if any, roads in Europe as congested as central London roads. The much lower Stockholm figure is a better indication of marginal congestion costs in fairly congested roads in Europe. For most of the roads, MSC would be much lower. Indeed it would be close to zero on most if not all rural roads.

Trends

The Commission (p.2) indicates that external costs are growing: "The high and growing proportion of the external costs of transport endanger its sustainability, which calls for policy action". Numerous problems - notably that of greenhouse gas - must be treated by an adequate policy, but the affirmation that all external costs are growing is disputable.

Concerning congestion, we have shown that the level of congestion is inferior to that indicated by the Commission. As far as the trend is concerned, the demand for urban transport does not follow, as some

could sometimes believe, an exponential curve, but a logistic curve, and we are in the almost horizontal part. This is due to three rules that regulate demand for urban transport. Firstly, the number of daily displacements is stable and between 3.5 and 4.0 per day. It increased slightly in the 90s. Secondly, and this partially explains the first, daily time allocated to travel is stable, as time is a scarce resource. The speed of intra-urban travel has increased in the last 20 years; on the one hand because new infrastructures (highways) have been created and on the other because the greater part of intra-urban travel is from suburb to suburb and the change from collective transport to the car accelerated the displacements. Contrary to what is suggested, in the city the car is a quicker mode of travel than public transport. In both Paris and Stockholm, two cities endowed with a good and expensive public transport system, one moves about 50% faster in a car than in public transport. In the realm of inter-urban transport the text mentioned indicates that "The density of traffic in Europe has increased over the past years, raising the probability of congestion in some areas" but does not produce references on congestion outside of cities[3]. Congestion is not a homogenous phenomenon but by definition applies to particular times and places. It is striking to observe the absence of data on speed of travel (which is the opposite of congestion)[4]. Congestion merits more empirical study on the evolution of speeds of travel over the last decades. It should not be presented as a homogeneously increasing phenomenon.

Road usage and the costs of infrastructure

Prud'homme (2006)[5] already mentioned that MSC was not the only principle for pricing. It competes with other principles (average cost pricing or Ramsey-Boiteux prices).

The Commission recalls correctly that, to lead to an efficient use of infrastructure, the approach should include price-relevant cost user cost (infrastructure use cost, congestion, scarcity costs) and marginal cost external cost (environmental costs, external accident cost[6]). But arguing that traditionally infrastructure has been borne by public authorities or by operators linked to public authorities completely ignores the basic issue that the financing of infrastructure and its cost recovery is not developed.

Declaring that investment decisions and usage decisions are and should be separate is the traditional answer. Sound cost-benefit analysis should determine investments. MSC pricing should determine their usage. Who could claim that only investment projects that pass the test of "sound cost-benefit analysis" are undertaken? De facto, it is assumed that these investments are optimal. But what if they are not? Consider two links, A and B, with a similar transport demand.

For A, a very generous highway has been built and is never congested. MSC pricing implies no congestion charges on link A. For B, not much has been done; there is only a two-lane road. Congestion is heavy, and MSC pricing implies high congestion charges. Over-investment will lead to low prices and under-investment to high prices. This contradicts many other transport policy objectives, and creates a perverse incentive against transport investment. Under-investment "pays". Why invest, then? Ministers of Finance would be quick to learn that lesson. When both investments and charges are the business of government, separating investment decision and pricing of road usage might make sense. If charges were greater than investment needs, fine; if not, the general budget would pick up the deficit. But

now that everybody, including the EU, wants to bring in the private sector, that reasoning is no longer possible.

What about the other modes of transportation?

The Commission text only briefly touches on the question of congestion in other forms of transport. Congestion in air and rail transport can be analysed using a model analogous to that of road congestion. The Commission text indicates that congestion "does not lead to queues" which is surprising when a few lines further on it is written that "congestion leads to delays and problems of arrival or departure times" (p.19). The text does not evoke congestion in urban public transport (metro and bus) where congestion appears also by a loss in quality of service (traveller standing up is less valorised than travel sitting down).

The main problem is the absence of discussion at the level of users of rail and air transport. Remember that the Commission's principle is for users to pay the cost they engender. It is not because external costs of congestion are low that the question of whether internal costs are covered should be forgotten. The question does not apply for air travel where passengers pay the price of their transportation. But what about rail travel, which is largely subsidised? In France, user payments cover about half the total expenses or "internal costs" of the service, even without considering external costs (which are modest). If we consider only operating costs – a bizarre procedure in a sector as highly capitalistic as the railway – the answer is still negative, as the expenditure for salaries only is almost equal to user payment; if we add the expenses for energy and maintenance, operating expenses are clearly higher than payments[7].

Clearly, internalisation of operating costs and externalities of congestion are not obtained for rail transportation as they are for road[8] and air transport. Does this conclusion remain valid if we consider the other external costs, in particular pollution and CO_2?

1 The report Mobility, Transport & Environment of the Ministry of Ecology and durable development (2006) taking the results of a study of the Ministry of Economy and Finance, suggests the figure of 92 billion EUR, or more than 5% of GDP.

2 To estimate the GDP of our two toll zones, we took the GDP of the agglomeration (Greater London in the case of London, the county in the case of Stockholm) multiplied by the number of jobs in the toll zone and divided by the number of jobs in the agglomeration. This procedure, which supposes that the productivity in the centre is equal to the productivity in the periphery, certainly underestimates, perhaps by 15 or 20%, the GDP of the toll zone, and thus certainly overestimates the cost of congestion ratio in the zone on GDP of the zone.

3 Measured in reference to free flow of which we have said what we think.

4 Although collected, the data on speed is, strangely, rarely diffused. We find none in the numerous publications of the European Commission.

5 Prud'homme R. (2001) "Marginal social cost pricing in transport policy" Discussion Paper, 7th ACEA SAG Meeting.

6 We will discuss this point later.

7 If we wish to learn the marginal cost, independent analyses are lacking. It is sometimes equal to zero, when we put an additional traveller in a half full train; sometimes very high when we add an extra train.

8 The case of freight road transport must be discussed in more detail to verify whether the greater usage of roads by trucks alters our conclusions.

3 Pollution and greenhouse gas

The Commission's text slices into the recent Green Paper on urban mobility (2007), which indicated that air pollution in the city was regularly increasing. Today's discussion text shows that air pollution by the principle pollutants has diminished in Europe by more than half in ten years, due to emission norms imposed on new vehicles by the European Union. It is however true that "air pollution still remains a challenge in dense and high traffic areas" (p.6). The transport sector's contribution to European atmospheric pollution is generally equal to 30% and should continue to decrease with the renewal of the fleet. In France, atmospheric pollution originating from roadways decreased from 6 to 3%, despite an increase in traffic of 2.2% per year. The main environmental question to be resolved is CO_2.

The cost of reducing greenhouse gas emission?

The Commission text evokes three main possible solutions to limit CO_2 emission: regulation, the cap and trade system, and of course, more taxation. The implementation of a tax destined to limit CO_2 emission is based on the following observations:

- CO_2 emission is not a local but a worldwide problem. A ton of CO_2 emitted in France or in China has the same effect on warming. Inversely, the same is true for reduction of a ton of CO_2.

- The Intergovernmental Panel on Climate Change (IPCC) estimates that stabilisation of CO_2 concentration at 450 ppm would limit the average increase in world temperature to 2°. To do this, annual planetary emissions in 2050 must be reduced to about 30 billion tons of CO_2. This is about 20% less than at present, and half the usual scenario of what would be produced worldwide in business. Carbon intensity (CO_2 rejects divided by GDP) varies greatly between countries and sectors. France produces the least CO_2 per million dollars of GDP, largely due to the domination of nuclear and hydraulic electricity. Carbon intensity is 180 tons; much less than that of other European countries: Italy (260 tons), UK (270 tons), Germany (290 tons) and Spain (320 tons). The United States (520 tons) does less well. The developing countries are also particularly inefficient; Brazil and Mexico have the United States' carbon intensity. The worst results are China and Russia, with more than 2,500 tons of CO_2 per million dollars of goods and services produced, 14 times greater than France. CO_2 emissions increase with economic growth and decrease with the adoption of 'green' technology. It is neither probable nor desirable that growth slows down. It is not certain that the various activities (industry, lodging, transport) scattered about the planet spontaneously adopt "green" technology to place the planet on the desired track of reducing CO_2. Introducing a tax on CO_2 would lead to the following dilemma: pay the tax or choose "clean" technologies. Figure on page 6 can be adapted to illustrate this situation. With a tax BE per ton of CO_2 emitted, the activities are indifferent between paying the tax or adopting "green" technology.

- The question is how to fix the tax level. We would attach more weight to the extensive report the G8 ordered from the International Energy Agency (IEA), published in 2007, which concludes that "none of the necessary

technologies required to place us upon the road of virtue should have a marginal cost of more than 25 $ per ton of CO_2 avoided", which means 18 €. Stern's report is very cautious. Based on the IEA analyses, he refers to a range of 10 to 40 $, which makes a ton of CO_2 from 10 to 29 €. He writes that the social cost of carbon: "a base of 35 £/ton of carbon – which corresponds to 12 €/ton of CO_2 – is reasonable in a decisional context which attempts to reduce the threat of dangerous climatic change". Consequently, tax on CO_2 should be fixed at around 20 € per ton. This being done, activity would adopt technology permitting the elimination of CO_2 for a cost inferior to 20 € per ton.

- The figure 20 €/ton also indicates the opportunity cost of a ton of CO_2 avoided. Effectively, the IEA report chose this figure as it corresponds to the average cost of the switch from one technology to another to avoid a ton of CO_2 worldwide. In fact, 20 € per ton is the result of the benchmarking of the best practice available to avoid CO_2. It is the cost of the average best alternative to avoid a ton of CO_2, which is nothing else than the social opportunity cost of avoiding CO_2. Choosing a strategy which permits saving CO_2 at a cost superior to 20 €/ton is a waste of resources as it is possible to do as much at less cost.

- Implementing a tax would be expensive but tolerable, which Stern's report evaluates at 1% of world GDP (this 1% is understood as being the actualised sum of reduction costs over 50 years, and corresponds, despite actualisation, to a cost in GDP slightly increasing). The planet's CO_2 emissions are currently around 35 million tons. A tax of 35 $ (25 €) matches the estimate in Stern's report. This would accomplish two things.

  Firstly, it would create, according to Stern's report and as we have seen above, the desired 50% reduction in CO_2 emission, meaning from 17.5 billion tons, to a cost certainly inferior to 17.5 x 35 = 610 billion dollars, let's say to 400 or 450 billion dollars. This represents about 1% of current world GDP. Secondly, it would bring in 610 billion dollars in taxes, which are not a cost and could be usefully employed or compensated by a reduction in taxes imposing a higher burden on growth.

Fairness, efficiency and the greenhouse tax

The pools of CO_2 savings are not in developed countries, but in countries such as China, Russia, India or Brazil. Opportunities for savings in CO_2 at less than 25 € a ton are rare in Europe. These opportunities are, on the contrary, abundant in these countries. It is there much more than in Europe that savings in CO_2 must be achieved. This is what an international carbon tax would do automatically.

This solution is of course politically unacceptable for the countries least efficient in CO_2, which often happen to be poor countries. Furthermore, they have a strong argument to use. Over the last two centuries, the countries that are now rich produced CO_2 without paying tax, and the CO_2 thus accumulated is one of the components of the problem of global warming. The solution thus necessarily requires "carbon assistance" compensation from the rich countries to the poor ones.

We should help these countries on which a carbon tax and their own current inefficiency would be an unfair burden. The best use for our scarce resources would be to spend it in China to avoid a

100 ton emission, rather than spend 1000 € to save a one ton emission in Europe. This assistance could take different forms, largely to be invented. One of them, perhaps the easiest to implement, is based precisely on the carbon tax, which could solve the distribution problem that arises.

Suppose that a carbon tax of 25 € is imposed on all countries (and which is a substitute for all the constraints packages often discussed). In China, it would have strong incentive power and would surely decrease emissions by 2 or 3 billion tons of CO_2 per year, at an economic cost of 20 or 30 billion EUR. It would also produce 70 or 80 billion EUR of taxes that would be kept by the Chinese government, which would reduce other taxes of an equivalent amount, in order not to slow down the country's development.

In France, this same tax would not greatly reduce emissions, at most 10%, or 40,000 million tons, at a low economic cost, probably inferior to 1 billion EUR. But it would produce close to 9 billion EUR in taxes that could be made available, all or in part, for developing countries. This would cost, at most, 10 billion per year (as the tax in question would be an economic cost for France as compared to a kept tax).

The rule would then be: all countries impose the same carbon tax of 25 € per ton of CO_2 for efficiency, but the rich countries donate all or part of the proceeds of this tax for justice.

How to implement a greenhouse tax in the transportation sector?

Failing a world carbon tax that corresponds to the principles evoked earlier, it is probable that targeted transport features are implemented. However, elementary efficiency rules should be respected.

- A policy is only good if it eliminates CO_2 at a cost inferior to the social opportunity cost of avoiding a ton of CO_2 (25 € per ton).

- To be efficient, the struggle against CO_2 must force internalisation of external costs generated by all types of transport (air, rail, and road). The policy of modal shift from road to rail is the typical example of a bad idea. Construction of new infrastructures to divert part of the transport demand to rail would be carried out at a cost far superior to 20 €/ton of CO_2 thus avoided - at a cost in hundreds of EUR per ton avoided. This policy fortunately seems to have been abandoned by the Commission in the paper that is discussed here. For the same reasons, implementation of a new tax should not lead to overtaxing one type at the cost of another, distorting fair competition between different modes. This could move demand to one type of transport and limit CO_2 emissions but at an unacceptably higher cost; the same result can be obtained with a lesser withdrawal from wealth (GDP). Lastly, any new tax should not be additional to existing taxes except if the total amount is lower than the optimal tax. It is the total amount of tax paid by the user, and not the amount of the new tax that guides consumer behaviour and brings it back to optimum.

4 Other costs

Road accidents are decreasing

Contrary to what the Commission states, accidents are not an externality. The Commission's statement has a major impact on the design of the public policy considered. Surprisingly, the policy proposed by the Commission makes sense.

Road accidents decreased by 21.4% between 2000 and 2004 (despite increased traffic) in the EU (p5)[1]. The Commission text underlines correctly that road accidents impose great cost on the community. The Commission is right to say that costs of accidents are already partially internalised by vehicle drivers. "External costs are those which are not covered by risk-oriented insurance premiums. The levels of external costs depend upon the level of accidents, but also upon the insurance system and legal practices. Aside from human suffering, the majority of the costs are material damages, administrative costs, medical costs, production losses and risk value" (p13).

Externalities or adverse consequences

Qualifying road accidents as externalities is not trivial. Economic theory considers externalities are the consequences of third party behaviour of an agent who does not receive material compensation. Taxation of behaviour that generates externalities aims at reducing its level. We tax gasoline to bring road circulation to its optimal. The important point to remember is that the quantity of externalities and the level of activity are linked functionally and not probabilistically[2]. The fact that skydiving provokes a percentage of accidents is a probabilistic connection. We must not confuse the fact that some high-risk activities (skiing, cycling, sky diving) create a percentage of accidents with interdependence of the profit function of an enterprise which pollutes and that of one which is useful for the consumer. This distinction is very important because no one wants to reduce the number of skiing accidents by taxing winter sports. This is why economic theory suggests internalising the social cost of accidents through liability insurance.

Insurance and incentives

Civil responsibility (liability) is a system that enables reduction of the number of accidents[3] by reducing driver negligence and not the number of kilometres driven. Its economic function is not only compensatory, but a deterrent. Compensation permits indemnifying the victims that settles the problem of risk distribution between parties. If compensation is perfect, the victim is indifferent to either of the two states: not having an accident, or having an accident and being compensated. With liability, the cost to the negligent inflictor of injury in an accident is no longer the victim's loss; it is the current value of the increase in premium that the inflictor of injury experiences as a result of being found negligent. The role of insurance is not only to ensure victim compensation but also to incite those who cause accidents to decrease their level of negligence by a system of franchise and "bonus malus".

Three elements are important here; the first is that the system adopted for treating road accidents does not treat them as externalities. This is why the objective is not to reduce the number of kilometres driven, but drivers' negligence; some of which are

ineluctably linked to road traffic. These should be reduced without deprivation of positive road externalities. Secondly, the system of liability and insurance aims at internalising an externality by compensating damage, transferring the responsibility to the aggressor, mutualising the cost of risk among drivers, and persuading dangerous drivers to modify their behaviour. Thirdly, liability settles a distribution problem and insurance provides positive incentive to change behaviour and not the quantity of activity at stake, while the tax settles a problem of inefficiency by decreasing the activity. Nosocomial illnesses (illnesses caught in hospitals) in France kill as many people as road accidents (and presumably also in other European countries). Nobody describes these fatalities as a hospital externality and suggests that they should be reduced by means of an internalising tax on hospital use. Health ministries and authorities try rather to develop codes of conduct and material that will decrease this most regrettable occurrence of nosocomial illnesses.

Similarly, reducing road accidents supposes improving road infrastructures, perfecting vehicles, regulating speed and other factors that determine the accident level exogenously. The Commission thus is right to suggest internalisation via expansion of insurance liability as public policy strategy. The option of charging the insurance company involved a lump sum at the level of external costs for each accident is correct (p21) because insurance companies have information on driver cost and could pass this cost on to drivers through differential premiums according to their accident risk profile. This is an incentive public policy strategy and would allow reducing accidents and not the traffic. The Commission suggests the right solutions but should specify that the framework for treatment of externalities by taxation does not apply to accidents, as it shows by the policy it recommends. A great deal of confusion would thus be avoided.

1 This assertion is interesting and contradicts the Commission Green Paper in which road accidents are increasing in Europe. In France, the number of persons killed on the roads has regularly decreased over the last twenty years, going from 8,412 in 1995 to 5,731 in 2003, or an average variation of about -5% per year. The mode of calculation changed in 2004, but we know that the reduction in mortal accidents has accelerated since 2003. Today it is (using the new definition) below 5,000. Nosocomial illnesses kill more people in France than the road. Curves relating to bodily accidents or serious injury evolve at the same rate. Is it different if we only consider cities? Certainly not in France. French statistics distinguish between 'urban' and countryside accidents. In urban areas the number of deaths goes from 2,757 in 1995 to 1,577 in 2003, or a reduction of more than 7% per year. Far from increasing more in the city than in the countryside, road accidents decrease there on the contrary more rapidly. The evolution is not different in other Union countries. The Commission itself publishes the evolution of number of deaths on the roads. It goes, for Europe, from 70,628 in 1990 to 42,556 in 2004, a reduction of about 3.5% per year. Reduction was characteristic of all countries, except Cyprus and Malta. We do not have the breakdown of the figures between city and countryside but we don't see why evolution observed in France (number of accidents decreasing more quickly in cities than in the countryside) would be inversed in other countries.

2 For an externality to exist, functions of profit or productive or consumer utility must be interdependent.

3 Calabresi G. (1970), The Cost of Accident, A Legal and Economic Analysis, Yale University Press.

5 Conclusion

It is interesting to verify if, in the present state of things, road users effectively pay the costs they engender.

We are not able to answer this question for all European countries, but the case of France is enlightening. Road users of course pay the cost of capital of vehicles, supplies and fuel they use. They pay the cost of infrastructure they use in the form of taxes specific to road transport. In addition, in the case of tolled highways (14% in terms of vehicle*km), the tolls fully cover infrastructure construction and maintenance. It suffices then to compare the specific taxation to the cost of infrastructures. Specific taxation in France amounted in 2004 to 34 billion EUR, greatly superior to 18.8 billion of public spending for roads, which means the creation and maintenance of road infrastructures.

Do road users also pay the external cost of congestion they create? The examples of London and Stockholm where we can measure the gain suggest that it represents from 0.1% to 0.2% of GDP of the zones considered (Prud'homme et Kopp, 2006), which were the most congested of the countries considered. By taking 0.1% for France and by dividing by the circulation we obtain 0.022 € per vehicle*km, or 2 euro cents. On one side the road users pay 0.044 € per vehicle*km and on the other they create a cost for the infrastructures of 35 euro cents and a congestion of 2 euro cents.

Road users then pay the cost of congestion they create. The Commission text goes in the same direction and suggests that this is the same for Europe: "It is true that transport activities, including vehicle purchase, ownership and use, are already subject to numerous taxes and charges, which may overall compensate, and in some cases even over compensate, for some of their social costs" (p.8).

One can disagree with the Commission's conclusion that "existing taxes have not been established for this specific purpose, and consequently there is often no direct relation between the cost paid by individual transport users and the additional cost they impose on society" (p.8). It is a strange refinement of theory. A cost is a cost. Whether it has been increased by a tax dedicated to decrease congestion or for any other purpose is not important. Individuals are adjusting their behaviour to cost (price-elasticity) and not to labels. At the end, the only remaining question is whether road users are paying a price that covers their costs. If France is representative of Europe, the answer is yes.

Road CO_2 already pays much more than 25 €/ton, somewhere in the area of a hundred euros, to be "shared" with congestion costs, road maintenance, etc. The politically incorrect truth is that a carbon tax should barely affect the road, at least in Europe. It is the sector, which, because of high taxation, is already energy efficient, which the normal rise in petroleum will improve even more, and which constructors will enhance. But the idea (dominant in France and sanctioned by de Boissieu in a report called factor 4)[1] that all sectors and all countries should reduce emissions by the same percentage is economically absurd; even from an environmental point of view.

Our comments focus on external costs (congestion, air pollution, greenhouse gas) and the cost of risk (accidents) linked to transport. We have

focused our remarks on road transport, which is the focal point of the Commission's recommendations. Several positive points represent a rupture with previous Commission publications, in particular its Green Paper on Urban Mobility (2007). Factually it appears that atmospheric pollution decreases as well as road accidents. The central problem remains CO_2 emissions. The fact that the text nowhere mentioned the modal shift as a positive public policy is good news because we know how costly and inefficient this policy would be. It is still unfortunate that extreme focalisation on external costs prevents the Commission from discussing the fact that public transport does not cover private costs which is a prerequisite to the discussion of internalisation of external costs.

In matters of public policy choices, much importance is given to taxation policy. We will continue to regret that its implementation remains imprecise. What should be done is to calculate optimal tax by taking into account taxes already paid, in reference to optimum. It is not what the Commission proposes. It uses marginal observed cost data and recommends excluding taxes already paid as psychologically drivers would not link these to external costs. This has no theoretical basis and would lead to abnormally increasing the cost of automobile circulation. The policy suggested to fight greenhouse gas seems badly informed on economic problems. To summarise, reduction efforts should be concentrated where a ton of CO_2 can be avoided at a cost of less than 20 € because otherwise there will be waste, simply because the same amount spent elsewhere would produce a greater reduction of CO_2. Road accidents also represent an example of imperfect mastering of economic aspects of proposed strategies. As much as the idea of increasing the cost of insurance for dangerous drivers is good, it is also based on an analysis of road accidents that obstinately presents these as externalities. These are risks; the consequences of which must be reduced without reducing transport activity, which has nothing to do with other external costs we combat by reducing the activity that is a source of nuisance.

1 Results of the working group on the reduction of GHG emissions in France – horizon 2050.DGEMP-Observatoire de l'énergie. http://www.industrie.gouv.fr/energie/prospect/facteur4.htm

GENEROUS ESTIMATES OF MARGINAL COSTS AND CONSERVATIVE ESTIMATES OF CONTRIBUTIONS ASSOCIATED WITH ROAD USAGE (FRANCE 2005)

		€/100 per motor vehicle.km
Marginal contributions	› Without highway tolls (a)	4.88
	› Including highway tolls (aa)	6.00
Marginal costs	› CO_2 (b)	0.57
	› Congestion costs (c)	0.10
	› Operation and maintenance costs (d)	1.94
	› Air Pollution (f)	0.17
	› Noise (g)	0.04
	› Accidents (e)	0.02
	Total	**2.84**
Marginal (contribution-costs)	› Excluding highway tolls	2.04
	› Including highway tolls	3.16

Notes

*(a) Specific fuel taxes (27.1 billion €) divided by the total number of vehicle*km on French roads (556 billion); one could argue that non-specific taxes which are a function of road usage, such as VAT on types or lubricant or vehicle repairs, should be included.*

*(aa) Specific fuel taxes as above, plus tolls paid (6.3 billion €), divided as above by the total number of vehicle*km on French roads.*

*(b) C02 emissions of road transport (128 million t) x unit price of CO_2 (25€/t), divided by the total number of vehicle*km.*

(c) Generous estimates of costs ranging from 0 in rural roads to 0.30 in downtown Stockholm and 0.81 in downtown London.

*(d) Calculated from data on French tolled highways. Share of labour costs + operation costs + repairs (23%) in total receipts multiplied by total receipts (6.3 billion €), divided by number of vehicle*km on such highways (77 billion). This is a gross overestimate, since a number of these highway expenditures (e.g. wages) are independent from road usage.*

*(e) Casualties (5,318) x unit cost of casualty (1 million €) – taxes on insurance and taxes on insurance for social security (3.1 billion €) divided by total number of vehicle*km. As argued in the text, counting accidents as a road externality is highly questionable.*

(f) Official French government number for 2000; air pollution levels have declined by about 40% since 2000; air pollution costs by even more (because of the non-linear dose-effect relationship; the data given here overestimate marginal costs of air pollution by a large margin.

(g) Motor vehicle noise damage is estimated to be about 1/4 of air pollution damage.

Sources

› *Most of the figures utilised come from a compilation of official statistics entitled: "2006: Faits et Chiffres: Statistiques du Transport en France", published by Union Routière de France, and available on the web (www.urf.asso.fr). The government estimates of air pollution costs come from the Instruction–cadre relative aux methods d'évaluation économique des grands projets d'infrastructures de transport, dated March 25 2004, issued by the Ministry of Transportation, and based on the findings of a report produced by a high-level commission chaired by Marcel Boiteux, known as Boiteux II Report.*

6 References

- Boissieu (de), Results of the working group on the reduction of GHG emissions in France – horizon 2050DGEMP-Observatoire de l'énergie. http://www.industrie.gouv.fr
- Calabresi G. (1970), The Cost of Accident, A Legal and Economic Analysis, Yale University Press.
- European Commission, Towards Fair and Efficient Pricing in Transport: Green Paper. COM(95) 691 final.
- European Commission, European Transport Policy for 2010 - Time to decide: White Paper. COM (2001) 370 final.
- European Commission (2007), Green Paper on urban mobility, http://www.uitp.com/mos/positionspapers/20-en.pdf
- Prud'homme R. (2001), "Marginal social cost pricing in transport policy" Discussion Paper, 7th ACEA SAG Meeting.
- Prud'homme, Rémy & Juan Pablo Bocarejo (2005), « The London Congestion Charge: A Tentative Economic Appraisal ». Transport Policy, vol.12, nº 3, pp. 279-88.
- Prud'homme, Rémy & Pierre Kopp, Le péage de Stockholm: Évaluation et enseignement, Revue transport, (en col.), mai-juin, nº443, 2007.

ACEA

Association des
Constructeurs Européens
d'Automobiles

European
Automobile Manufacturers
Association

Avenue des Nerviens 85
B-1040 Bruxelles
Belgium
TEL +32 2 732 55 50
FAX +32 2 738 73 10
www.acea.be