

INTRODUCING MORE RATIONAL TRANSPORT PRICING IN EUROPE

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Pricing of transport in Europe has traditionally had little to do with economic efficiency. It has generally been closely related instead to the fiscal needs of governments. In many countries it has also frequently been used as part of wider political and social processes. This has gradually changed in recent years, with the appreciation of the role pricing can play in stemming excessive environmental damage associated with transport and as the importance of making economically efficient use of transport infrastructure has become more appreciated. Significant changes in attitude have emerged within European nation states as to the importance of achieving sustainable transport, and the theme is central to the transport strategy being developed within the European Union. This paper looks at some of the changes that have taken place in Europe and sets them in a broader geographical context. It takes as axiomatic that 'rational' implies efficient in its broadest sense to embrace the range of social and environmental consideration in addition to more narrow financial criteria.

Prices in transport have a variety of functions. In a free market economy, they provide signals as to the effective desires of consumers to use various transport services while at the same time reflecting the costs of providing these services. Manipulation of prices by policymakers can provide powerful tools to influence not only the overall magnitude of transport in an economy but also the modes used, the spatial and temporal pattern of transport use and the groups of individuals that have effective access to various elements of the transport network. Attitudes as to how prices should be used, however, vary considerably.

The aim of this paper is to initially provide a brief outline of the economic approach to transport pricing. The issue can be complex, and the coverage here is, by necessity, far from complete. Initially broad approaches to pricing are reviewed and then rational pricing is considered. A particular emphasis is placed on the way pricing affects environmental and resource use. Section IV of the paper is devoted to contrasting the previous experiences of transport pricing in Europe with this theory. While all modes deviate from the economic 'ideal,' the main focus is on road transport. The penultimate section is concerned with the more recent experiences of transport pricing in Europe, particularly within the European Union (EU), where there has been enhanced emphasis on attempting to include greater rationality into the structure of pricing (Commission of the European Communities, 1992). The final section offers some concluding thoughts. While there are many aspects to the pricing issue, the primary attention here will be on the way transport prices in Europe relate to the idea of sustainable development.

APPROACHES TO PRICING

The attitude of market-oriented economists to the pricing of transport has often been at variance with the policies pursued by the public authorities. In part, this can be attributed to the wider concerns exercised by public policy makers that transcend the notions of social welfare maximization underlying neo-classical economics. Questions of equity and access being seen as important as economic efficiency. But the divergence of view also reflects issues of implementation and enforcement that are often assumed away by economists: transaction costs making the calculus of concepts such as marginal cost pricing somewhat less elegant in economic models.

The market-based economic approach to prices is founded on the idea that it is rational to maximize the utility derived from resource utilization, which would include environmental resources, by making users aware of the full opportunity costs involved. Market-based prices have their problems, but economists generally argue that they are more efficient at doing this than the alternatives. In terms of recent debates over sustainable development, for example, one theoretical argument is that complete property rights allocation would solve the problem as people would reflect their priorities through trading these rights. They would buy and sell rights to environmental resources with the market price adjusting until welfare is maximized. How these rights are to be initially allocated, however, and how the trading subsequently is to be effectively policed are issues seldom fully considered.

Those with a more interventionist bent tend to view pricing as an instrument to achieve a specific and targeted end. This may be a reduction in traffic congestion levels (i.e. though the use of road pricing), the attainment of a set level of atmospheric pollution or the raising of a given amount of government revenue.

This is fundamentally different to the free market approach in the sense that the price is administratively established rather than stemming from the interactions of supply and demand. The approach is part of a command-and-control strategy towards environmental policy in that it is specifically directional in meeting set objectives. Expert opinion is used to establish relevant elasticities in the estimation process which, inevitably, leaves uncertainty over the eventual outcome. The approach also differs from the strict market approach, where property rights are allocated, because the revenues generated by pricing go to some central agency (usually the local or central government) rather than being retained in the market. This implies a different set of distributional outcomes in that these revenues will ultimately be distributed by the authorities. This can lead to a second round effect of they are used for such things as transport subsidies or infrastructure investments.

Whatever approach is favored, the evidence is that in European countries, as elsewhere, the actual pricing of most transport has little to do with conventional economic notions of either rationality or of meeting a larger matrix of explicit social welfare criteria. The degree of deviation differs, however, between modes of transport and between various components of transport supply for any given mode. But it is particularly true of infrastructure such as roads, railways, ports, etc. and of urban transit services where there is a high degree of public ownership. Even where market forces are allowed to operate (e.g. in most European trucking markets) the input prices of infrastructure is often manipulated to influence final supply conditions.

In the past, the main emphasis in Europe has been centered on the distortions that exist in the pricing of transport infrastructure use - the 'track cost question'. The issue is still topical, especially regarding railways, but more recently, concern has tended more towards traffic congestion pricing on roads and at airports and on the pricing of environmental externalities (Button, 1993; Verhoef, 1996). In all cases, the gap between the arguments presented for rational pricing and the policies that are actually being pursued in Europe remains, although there are now tentative signs that it may be narrowing.

RATIONAL PRICING

Neo-classical economists have traditionally laid down rigid criteria that permits the maximization of economic welfare. The guiding principle is that of marginal cost pricing—the equalization of the charges paid at the margin for goods or service with the marginal utility derived from their use.

Conceptually, the idea is simple, but in practice, there are considerable problems in implementation. At one level, there remains the issue of exactly what constitutes marginal cost. Indivisibility and uncertainties pose another set of problems.

More germane to current debates is the issue of the external costs associated with the environmental impacts of transport. Transport impinges on the environment in a variety of ways. Modern scientific research has led to a fuller appreciation of many of these effects, both on the natural environment and upon human health (Banister and Button, 1993; Button and Rottengather, 1996). Rising incomes in many parts of the world have more generally led to the environment becoming a superior good as people have greater amounts of leisure time and as more immediate material needs are gratified. Added to this is the broader, intergenerational concern that has manifested itself in concerns about the ability of modern society to achieve sustainable development.

The concern about the environmental costs of transport has become more pronounced, as it is appreciated that they impose real economic costs even to current generations. The development of more sophisticated measurement techniques, coupled with new economic methods of placing monetary values on adverse environmental effects, have allowed more consistent assessments of the problem. Table 1, for example, offers some calculations reflecting the effects of some transport externalities expressed in terms of GDP equivalents.

TABLE 1 Estimated Environmental Costs of Transport in Great Britain (1994/95) as Percentage of GDP¹

	Lower end of range		Upper end of range	
	All transport	Road Transport	All transport	Road Transport
Air pollution	2.4		6.0	
Climate change ²	1.8	(4.6)	3.6	(12.9)
Noise and vibration	1.2		5.4	
Accidents	5.5	(5.4)	5.5	(5.4)
Total quantified environmental costs	10.9	(10.0)	20.5	(18.3)

¹ The range of environmental costs included is limited and excludes loss of land, severance of communities, loss or disruption of habitats, visual intrusion, etc.² The estimate is based upon taking the amount of global carbon dioxide emissions attributable to the UK (2.8%) and multiplying that by transport's share in the UK (24%). It is assumed that annual global warming damage amounts to between 1 and 1.5% of GDP in developed countries and between 2 and 6% of GDP in other countries.

Source: UK Royal Commission on Environmental Pollution (1994).

While macro level studies are helpful in enriching the general policy debates, the effectiveness of different policy options in optimizing the use of transport is much less certain (Button, 1994b). Much of the difficulty stems from the comparative dearth of actual experiences of using pricing instruments as part of environmental policy in the transport field. Certainly, there have been no European policies comparable to those deploying tradable permits as with lead additives to fuel in the US that offer a quasi-property right allocation approach to the topic (Hahn, 1989).

A further problem is that so many prices are distorted from what most neo-classical economists would deem to be their optimal level, in that it is difficult to define the appropriate second-best price to affect any particular environmental effect. While road pricing in cities, for instance, could be used to improve the congestion situation by possibly encouraging through traffic to use longer by-passes at the same time as it produces a temporal and spatial reallocation of local traffic, this can lead to higher greenhouse gas emissions.

One of the important considerations when looking at the use of pricing in the context of sustainable development is the matter of just what prices should be adjusted to reflect environmental costs. One way of approaching this is seen in Figure 1, which shows the chain of events from cause to effect in terms of how price distortions impact on the environment.

Economic causes →	Physical causes →	Symptoms →	Effects
Prices	Traffic volume	CO ₂	Ill-health
Financing	Infrastructure	NO _x	Global warming
Investment Criteria	Vehicle stock	SO ₂	Acid rain
Regulations	Vehicle composition	Pb	Excess resource depletion
Policing	Use pattern	etc.	Social disruption
	Design of vehicles		

FIGURE 1 From cause to effect in the environmental economic chain.

Adjustments should ideally, in most instances be at the initial stage of the chain this implies not only that the price of inputs reflect new opportunity costs but also where shadow prices are used in the CBA calculations of investment and regulation, they should be appropriately defined. Where a comprehensive approach at this stage is precluded because of practical or political considerations, then it may become necessary to adjust prices further down the chain. For example, if it is not possible to price noise nuisance, then it may be appropriate to have differential prices on vehicle types that act as a surrogate. Alternatively, there may be charges on vehicles to fund the construction of noise barriers.

Prices, therefore, can be adjusted at several different stages in the chain and, in the practice, the authorities in Europe have pursued a number of approaches.

Technical issues also surround the calculations of the shadow prices of the resources used in infrastructure provision, particularly the issue of the efficient use of resources. The pricing concern here reflects a worry that some forms of institutional arrangement, particularly the state ownership of transport, can result in x-inefficiency and excessive costs. Equally from the perspective of infrastructure investment, the

widespread use of cost-benefit analysis (CBA) requires sound knowledge of shadow prices for it to be genuinely objective in its orientation.

THE SITUATION IN EUROPE

To generalize about transport pricing in Europe is inappropriate. Each nation has its own separate way of treating the pricing of transport, and superimposed on top of this is the set of pricing principals that the EU is gradually imposing on member states.

For a number of reasons, approaches adopted in Europe to meet the challenges of sustainable development have differed somewhat to those favored in the United States (Button, 1997). Pricing policy in a variety of forms has been more widely accepted as discussed below. One reason for this is the hypothecation of taxes is much less common in Europe where there is a long tradition of road user charges seen as a source of general government revenue. This means that the European population, as a whole, is used to much higher road charges. Table 2 offers some indication of the relative position of several European states regarding the taxes paid by road users and their attributed track costs. The situation in the US at the time was comparable basis to road users only paying 63 percent of their attributed costs in taxes.

TABLE 2 Indirect Road User Charges (fuel and vehicle taxes) in Selected European Countries (ECU million, 1986)

Country	Revenue from:			Total	Expenditure on Roads	Revenue as % of Expenditure
	Fuel Tax	Vehicle Taxes	Tolls			
Belgium	1,014	320	-	1,344	1,777	75
Denmark	455	280	-	735	751	98
Germany	7,936	2,623	-	10,559	11,029	96
Greece	473	97	1	571	334	171
France	6,342	1,054	1,135	8,531	6,413	133
Ireland	304	28	-	332	213	156
Italy	5,155	420	-	6,287	3,464	181
Luxembourg	57	9	-	66	101	66
Netherlands	1,151	809	-	1,960	2,310	85
Portugal	244	18	-	262	n/a	n/a
UK	5,504	2,212	-	7,716	4,286	180
EC Total (exc. Spain)	28,635	7,870	1,848	38,353	30,678 (exc. Spain & Portugal)	124 (exc. Spain & Portugal)

Source: European Commission.

The institutional arrangements within the EU also mean that transport policy is effectively controlled at several levels. The EU itself is mainly concerned with broad strategies and with ensuring that prices are not adjusted by member states so that trade within the Union is distorted. It, therefore, tends to lay down general guidelines and principles that states must adhere to. How they are then implemented is often left to the national authorities. National governments have control over the way transport infrastructure and operations are priced within their territory. They also have powers of

taxation and fining violators that can often act as a quasi-pricing system. The fines, especially where transport is engaged in EU trade activities, must meet EU criteria.

Beside the broad philosophical difficulties that exist within the Union regarding transport pricing, there are also differences in national priorities concerning the environment, particularly lower income members given a higher priority to conventional GDP indicators than to environmental considerations. There are also variations in national sensitivities to environmental issues stemming largely from geographical factors.

Within member countries, state and urban authorities also exercise control over transport prices. City authorities traditionally regulate parking fees and, in some countries, have initiated local road toll regimes. Since a considerable amount of traffic is urban, these powers can exercise a major influence over the level and nature of traffic.

Even within this context, countries in Europe have two broad approaches to the pricing of transport. In the case of France, Germany and many of the other Continental nations, the attitude has traditionally been that transport serves a very broad social function, with a strong emphasis on social cohesion and regional economic policy objectives. The pricing of transport in this context was seldom been related to economic costs, and the public provision of infrastructure and many services has been common. Subsidies were widespread, being financed both through taxation and the manipulation of the market to produce cross standardization. This continental approach essentially treats intervention as a justified norm, with transport markets only allowed free reign when this does not conflict with the wider goals being pursued.

Contrast to this, the approach favored in the UK and, to a lesser degree in some of the smaller Continental states, is based on the premise that transport is much like any other sector and should, therefore have prices that reflect broad cost and demand conditions. Unlike the Continental approach, the onus for introducing prices that seriously deviate from costs lie in the hands of the advocates of such actions.

In terms of surface transport, this later approach has meant much less intervention in transport markets, and where there has been intervention, it has tended to be with a lighter hand. For example, the UK, with the exception of periods of hostilities and their aftermath, has not attempted rigorous control of trucking rates. More recently it has also been the adherents to a broad Anglo-Saxon philosophy that have been at the forefront of market liberalization and privatization in transport, even with respect to the provision of infrastructure.

While one can highlight how these differing philosophies have influenced the overall pricing of transport in various EU states, the attention here is mainly on the environmental dimension. This, however, must be interpreted very broadly, as prices effect aggregate demand for transport as well as influencing the way various elements of it operate. While adjusting the relative prices of road use to reflect their environmental costs may improve the social efficiency of the modal split if in absolute terms, for example, all prices are below cost may be detrimental in terms of the overall contribution of transport to excessive environmental deregulation.

Much of the EU's transport policy has been based upon improving the European transport network to meet the anticipated growth in traffic that closer economic ties since the Single European initiative of 1992 has brought about. Improvements have included removal of institutional and technical impediments to the use of the existing infrastructure networks as well as schemes to expand networks - the Trans-European

Network initiative. Combined freight transport has been given a particularly high priority. Pricing, while not ignored, has been given relatively limited attention.

Until recently, the EU has been concerned that the prices charged for transport should reflect the financial costs involved. In the early years of the Union, attention was initially focused on trying to develop maximum and minimum rates for trucking (the forked tariff) and then reference tariffs, but now the aim is to define infrastructure pricing principals to ensure that track costs are appropriate covered and that other marginal costs are adequately reflected in prices.

A number of EU countries are now adopting pricing measures to meet international commitments to contain global warming gas emissions. Some European states, such as Sweden and the Netherlands, have initiated explicit carbon taxation measures to limit the amount of carbon dioxide emissions. The UK has favored a different strategy by implementing a fuel tax that rises by three percent annum, with the aim of continuing the fiscal pressure until carbon dioxide emissions reach agreed levels.

Direct pricing, according to the use made of transport infrastructure is still limited to tolled waterways and a small number of urban toll rings in Europe, but there are pressure for these regimes to be extended. These are driven as much by financial considerations on the parts of government as by any consideration of the environmental benefits that may result.

The EU's institutional interest in the environmental costs of transport and the issue of sustainable development stem mainly from the early 1990s (Commission of the European Communities, 1992). Those involved with transport (e.g. Directive General VII) have worked closely with those concerned with the broader initiatives of the Commission to develop a union strategy in response to the global policy initiatives stemming from the United Nations Conference on Environment and Development (1992). The Union's response has been to consider a range of possible measures to conform with a strategy of sustainable mobility. The use of pricing policies that make allowance for the external cost of transport has been adopted as one of the key instruments in the favored strategy.

Such a framework is the essential foundation for the realization of the objective of sustainable mobility for the Community as a whole. If costs are not properly allocated, stresses are bound to arise as users favor disproportionately the transport services and systems that do not charge their full cost. If costs are being allocated on the basis of significantly different principles in different States or localities, not only will significant distortions affect competition between transport operators, but it will be very difficult to develop Community-wide transport systems in a more integrated way. ...In the short term, emphasis will be placed on the development of a framework for the imputation of infrastructure costs. Particular attention will be given, in light of the 1992 program on the harmonization of excise duty on diesel fuel, road tolls and charges to possibilities for adopting a truly territorial system for taxation of heavy goods vehicles. In the medium term, proposals will need to be made concerning charging for externalities so that environmental problems will be addressed by the fundamental economic mechanisms at work in the transport sector. [Commission of the European Communities, 1995]

Directly charging for road through the use of tolls brings the user closer to the immediate economic costs of providing infrastructure. This, in turn, can influence the overall use of the facility, and while not a direct instrument of environmental policy, removes one government failure that contributes to excessive environmental degradation.

There is increased use of direct charging in Europe, both on tolled inter-city highways and, in the case of a number of Scandinavian cities such as Bergen, Oslo and Trondheim, use of the urban road network. In all these cases, the motivation is primarily financed either to fund an existing facility or to raise revenues for network expansion (Gomez-Ibanez and Small, 1994). Equally, the pricing is not always national in the economic sense, since in most instances the tolls do not reflect congestion levels. This is changing, however, and differential charges have been deployed on at least one French auto route into Paris and is practiced in some of the urban toll rings.

While hardly common, pollution charges have been used in relation to EU transport with some success. One clear illustration of where fiscal incentives (in this example, coupled with regulation) have provided particularly effective has been in reducing the levels of lead (Pb) pollution. Many European countries have introduced significant tax differentials between leaded and unleaded gasoline (see Table 3), but equally, the banning of normal gasoline (providing the tank capacity for garages to stock unleaded fuel and leaving only the more expensive super) has effectively further reduced the real choice open to most automobile users in the Netherlands, Switzerland, the UK and Germany. The combined impact of these measures in the UK was a rise in vehicles using unleaded gasoline from 0.1 percent of the car park in March, 1988 to 25.9 percent in October, 1989. Similarly in the pre-unified Federal Republic of Germany, the percentage of automobiles using unleaded rose from 11 percent in 1986 to 28 percent in 1987.

TABLE 3 Fuel Prices and Fuel Taxes in Selected Countries in the Third Quarter, 1991 (Nkr/L)

Country	Leaded fuel		Diesel	
	Price	Tax ²	Price	Tax
Belgium	5.96	3.95	3.49	1.63
Denmark	6.18	4.17	3.12	1.12
Finland	7.11	4.35	4.93	2.59
France	6.24	4.63	3.46	1.95
Italy	8.03	6.05	4.90	3.27
Netherlands	7.10	5.08	3.38	1.68
Norway	7.13	4.47	2.78	0.69
Portugal	6.66	4.79	4.22	2.48
Spain	5.57	3.63	3.83	2.02
UK	5.80	3.85	4.35	2.53
Sweden	7.39	4.98	4.24	1.36
Switzerland	4.98	2.95	4.76	2.86
Germany	6.25	4.37	3.75	2.13
USA ¹	2.37	0.71	2.00	0.70
Austria	5.55	3.18	3.89	1.83
OECD, Europe	6.27	-	3.94	-
OECD, Total	3.23	-	3.07	-

¹Price and tax for unleaded fuel

²Including VAT

Source: International Energy Agency (1991)

EMERGING INFLUENCES ON PRICING

While the changing approaches to official pricing interventions in the EU transport markets has been directed towards a more rational framework, other developments may be of equal long term significance. European transport, as in many other macro regions, is increasingly being turned over to market forces as privatization and deregulation takes place. The incentive structure is thus changing dramatically as administrative pricing changes to commercial pricing.

The implications of privatization and deregulation on transport prices in Europe is, compared to the US, relatively under explored. This is not the place to of a fully referenced précis of the literature that does exist but some observations can be made. The evidence we do have, though, is clearly that with the removal of state intervention in pricing, the prices charged for transport services have generally fallen. This trend is not universal because in the past there has been extensive cross subsidization inherent in the administrative prices levied. Even where state controls remain in situations where privatization has removed public ownership of monopoly infrastructure (e.g. as in the case of the main UK airports) there is evidence that prices have adjusted nearer to costs.

The long run implications of these developments for the environment are not immediately transparent as much of the available empirical work is still tentative. Just taking as an example, the UK is partly privatizing its railway operations and significantly changing the way in which its track is allocated. One of the main aims is to allow market prices (or in the cases of track, quasi-market prices) to influence the use made of the railways. Table 4 provides some thoughts on just how this will ultimately influence mode split in the UK and the overall use made of transport. It is a balance sheet but one that many other European states are having to consider as they redefine their transport policies.

While the introduction of more market driven pricing can be seen as leading to more rational resource allocation as previous intervention failures are removed, there is still a recognized role for the public authorities in terms of containing the adverse external consequences of transport. It is in developing this function that the EU authorities are now directing their attention. In terms of Table 4, the issue is becoming one of reducing the negative effects of institutional reforms, and especially those on third party non-users, without significantly reducing the positive implications for transport users of market driven conditions.

TABLE 4 Some Possible Effects of Rail Privatization in Britain and Implications for Rail Use and Indirect Environmental Impacts

NEGATIVE	POSITIVE
<ul style="list-style-type: none"> • Loss of network integration, leading to more complex ticketing, lack of coordinated timetable information, etc., especially for trips involving more than one Track Operating Company (TOC). • Major staff reductions in order to reduce costs are likely to adversely affect services and service quality and reliability. • Integration and joint ticketing with bus services likely to reduce, especially where viewed as anti- competitive. • TOCs likely to promote profitable off-peak leisure and long distance business travel rail markets which generate additional travel rather than shift passengers from road and air to rail. • Short length of TOC franchises discourages investment in attractive and energy-efficient new rolling stock. • Vastly increased organizational complexity, leading to increased costs, difficulties of communication and increased accident risks. • Railfreight businesses set up to promote competition all sold to single US operator. 	<ul style="list-style-type: none"> • More aggressive and professional marketing of train services by individuals TOCs. • New ways of using and training staff could improve customer care and increase productivity. • Increased integration of rail and bus services, especially from new owners of TOCs which also operate buses. • Improved services operated by some individual TOCs could attract travelers from road to rail on certain routes. • Access to private sector finance could encourage investment in new rolling stock and infrastructure. • Grants available to freight operators to encourage shift of freight transport from road to rail. • Single freight operator in stronger position to experience effectively transferred to Britain.

Source: Potter and Enoch (1998)

CONCLUSIONS

Europe, like other parts of the world, has a tradition of government intervention in transport markets. The detail and scale of interventions differs between countries but are generally characterized by high levels of public ownership and regulation of supply and prices. Where it differs a little from the US is that with respect to roads, there has been a tendency to allow the overall price of use to exceed costs. This tradition perhaps makes it easier for the authorities to adjust prices in respect of environmental and other costs.

In terms of autos, the states of the EU have pursued some interesting initiatives to make pricing more rational in an economic sense. The Commission of the Union has also shown increasing interest in ensuring that prices of transport reflect their full marginal costs. These measures to reduce the external costs of transport have been accompanied by other actions such as privatization and economic deregulation that have, in particular,

increased the use of market pricing by operators using transport infrastructure. In the longer term it is likely that these latter measures will prove at least as important as changing the intervention prices in terms of bringing more rationality to the way transport is priced in the Union.

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