

Reforming prices in inter-urban transport

A review of research findings

This essay was prepared for seminar one of the IMPRINT-EUROPE project: Key Requirements for Implementing Transport Pricing Reform

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1 Introduction

This report was written within the EU-project IMPRINT-EUROPE in preparation for seminar one taking place in November 2001. Its topic is the reform of inter-urban transport prices.

Inter-urban transport has multiple characteristics. It comprises of inter-urban rail, road and air transport. Air transport is mostly inter-urban and mostly passenger transport whereas road and rail transport are the main transport options for freight transport. The following dimensions can be considered:

1. Differentiation of transport means: For road transport: private car, motorcycles, bus, light goods vehicles, heavy goods vehicles; rail transport: passenger and freight; for air transport: passenger and freight; waterborne transport: inland water transport (freight).
2. Functional and regional differentiation: inter-urban passenger traffic, short and long distance freight traffic. For aeroplanes short and long distance passenger flights can be distinguished.
3. Distinction between different types of vehicles: road gasoline and diesel; rail electricity and diesel traction.
4. The air traffic sector is organised by three levels of specific activity: air traffic control, airport services and airline services. Air traffic control is the domain of the state. Airport services consist of aeronautical and non-aeronautical activities. Among the former are runway provision, airport traffic control or parking; among the latter cleaning, ground transportation, passenger handling or security checks. At main airports the runway capacity is the dominating bottleneck factor so that airport slots are defined as time units of runway capacity which allow for the operation of one aircraft. Due to the history of air traffic the main airports are dominated by the formerly designated national carriers. When it comes to slot allocation they insist on their “grandfather rights” and control the allocation process through their monopoly power.¹

As there are not many studies that compare the different modes of transport on inter-urban routes, articles which deal with certain facets of the transport sector have been chosen. It gives quite a practical focus to this paper and the additional papers prepared for the seminar by the other partners are a good theoretical completion.

First there is given an introduction about the forecast about the future trends of transport and a short definition of external costs. Then it comes to a study which has done a comparison of different modes of transport for some example corridors which are described shortly. Another reference is a preliminary² result out of the EU-DESIRE project where designs of inter-urban road pricing schemes are discussed. The next aspect concerned is a topic out of the road sector too, it is about a road user charge for heavy duty vehicles. Then a topic out of the railway sector is picked out as a central theme, it is the net access and debate about the

¹ Nash et.al. p.26

² The deliverable referenced here has not been formally accepted by the European Commission yet (27.09.01)

prices for the use of tracks. The pricing discussion for tracks is closely bound to the question if transport and infrastructure carrier have to be separated.

The air transport sector is represented with two studies, one focuses on the more efficient use of time niches at airports and the other is comparing the advantages and disadvantages of land-bound and air vehicles.

With the references chosen it is given an overview about recent research results in the field of inter-urban transport. The practical bias is bound closely to implementation procedures of transport pricing reforms which are the goal of the IMPRINT-EUROPE project.

2 Theoretical background

2.1 Forecast of future trends in inter-urban transport 1995 to 2010

The road transport volume will increase significantly for EUR17³ in the 1995-2010 period of time. Car traffic will increase by 26%, freight transport +30% and bus traffic volume +45%. The loading factors will not change much until 2010. The rail transport volume will increase in train-km and passenger-km by 26% but the freight volume is expected to remain at its 1995 level.

Air transport volume will increase in passenger-km by 5% per year, in aircraft-km by 4,1% per year and in aircraft movements by 2,3% per year.

For waterborne transport volume no growth of vehicle km and tonne km is assumed.⁴

These figures show vividly that a change in transport policy is necessary to reduce the negative external effects of transport. The EU-approach is to work with marginal cost pricing to reform the prices in inter-urban transport.⁵

2.2 Definition of external costs generated by inter-urban transport.

Nature and landscape

The determination of the external effects on nature and landscape is difficult. Two kinds of effects can be distinguished: Effects caused by the provision of the infrastructure on the one hand and effects caused by the utilisation of the infrastructure on the other hand.⁶

Up- and downstream processes

The production of all types of energy causes additional nuisances due to extraction, transport and transmission. They depend directly on the amount of energy used. The production of vehicles and rolling stock is important in the longer run, considering the life cycles of different transport means. These elements are causing additional emissions into the air, having an additional effect on air pollution and climate change costs. The same arguments hold true for the

³ EUR17 = 15 EU countries plus Switzerland and Norway

⁴ INFRAS/IWW p.15

⁵ COMMISSION OF THE EUROPEAN COMMUNITIES, WHITE PAPER

⁶ INFRAS/IWW p.43

infrastructure elements themselves. In the long run emissions have to be taken into account as well.⁷

Climate change

The estimation of the costs of climate change has to face many uncertainties. The damage cost approach is very limited since climate change risks are very difficult to estimate in the long term. Thus one usually also considers avoidance cost approaches, based on specific reduction aims. One can estimate the costs of climate change based on scientific studies which estimate the costs for developed countries in regard to a scientific reduction aim.⁸

Air pollution

Air pollution brings about different costs which are relevant for society. The following elements should be considered: impacts on human health, impacts on materials and buildings, agricultural crop losses and forest damages.⁹

Noise

Transport noise not only imposes undesired social disturbance, but also influences the individual well being which can entail physical and psychological health damages. Hearing defects can be caused by higher noise levels, while lower levels may cause nervous stress reactions, such as change of heart beat frequency, increase of blood pressure and hormonal changes. Noise exposure increases the risk of cardiovascular diseases.¹⁰

Accidents

The cost components per casualty are added in order to estimate social accident cost. External costs are computed by subtracting transfers from liability insurance systems and gratification payments. The resulting external costs per casualty are multiplied with the number of fatalities and injuries. The total external costs are allocated to the modes according to the responsibility in the accident.¹¹

Congestion costs

Total social congestion costs are an artificial measure of ineffective infrastructure use, which are based on theoretical reflections on marginal cost functions rather than on the physical measurement of economic or social damages. Total congestion costs alone are not a very meaningful figure. They describe the benefit in social welfare which could be achieved if infrastructure were used optimally, but it does not say how to reach this optimum. An optimal infrastructure use is reached by internalising congestion costs via a Pigou tax and the collection of this tax in real terms is not for free. Although the transaction costs and not the revenues from an internalisation system denote the costs for optimising traffic behaviour, the latter provides a good basis for estimating the magnitude of transaction costs.¹²

⁷ INFRAS/IWW p.52

⁸ INFRAS/IWW p.40

⁹ INFRAS/IWW p.32

¹⁰ INFRAS/IWW p.24

¹¹ INFRAS/IWW p.16

¹² INFRAS/IWW p.117

2.3 Transportation choice

Concerning transport and in inter-urban transport in particular it must always be reminded that transportation is no end in itself. There are reasons for people to travel and for shippers to transport goods. Transport aspects are strongly bound to infrastructural settings. It means that more efficient transport pricing solutions have to take into consideration the interaction with options to change the preconditions for transport reasons like settlement of industry or the spreading of shops, cinemas etc.

Transportation choice is a value itself as described in the following section. This means for inter-urban transport that the availability of several transport options is a benefit for society. If pricing reforms in inter-urban transport are implemented these aspects need to be taken into account although it is difficult to estimate and evaluate them.

Consumers and society benefit from a diverse transportation system that offers users viable transportation choice. Modern transport systems generally serve motorists well, but non-drivers often encounter significant barriers when trying to access essential services, education, employment and social activities.¹³

2.3.1 The value of Transportation Choice

Transportation choice refers to the quantity and quality of transportation options available to an individual group, taking into account their different needs and abilities. There are several specific reasons for which society may value transportation choice.

Consumer savings and satisfaction

An efficient transportation system gives consumers appropriate choice.

Consumers can benefit from alternatives that allow them to save money, avoid stress, provide additional benefits and reduce their need to chauffeur non-drivers.

Efficiency

Society can benefit from reduced traffic congestion, facility cost savings, increased road safety, environmental improvement and consumer cost savings.

Equity

A lack of transport choice often limits the personal and economic opportunities available to people who are physically, economically or socially disadvantaged. Increasing transportation choice tends to improve services and opportunities for disadvantaged people. For this reason it is argued that “basic mobility” should be considered a right.

Option value

People who do not currently use an alternative mode may value its availability as a form of insurance to accommodate future needs. Most people go through periods of life when they rely on alternative modes, due to physical disability, financial constraints, vehicle failures or other limitations to driving. Option value contributes to “robustness”, by providing fallback options that can be used if primary systems fail.

¹³ Newman/Kenworthy

Livability

People may value some travel options, such as walking and cycling, and living in or visiting a community where these activities are safe, pleasant and common. As a result, transportation choice can help communities become more “livable”, resulting in increased property values and commercial activity.¹⁴

2.3.2 Network Effects of Transportation Choice

Most efforts to evaluate transportation choice focus on individual modes, such as walking, cycling transit. Many non-automobile trips involve more than one mode, and efforts to improve one often have positive spillover effects on other modes. A comprehensive evaluation of transportation choice should include options for interregional travel, vehicle rentals, and travel substitutes such as telecommuting and delivery services. The quality of the non-automotive transportation system (the overall transportation network that serves nondrivers) is as good as the weakest link. If walking is difficult, unsafe or unpleasant, then transit use becomes less feasible.¹⁵

2.3.3 Factors Affecting Access

Movement is not an end in itself. The ultimate goal of most transport is “access”, the ability of people to obtain desired goods, services and activities. Evaluating transportation in terms of access allows a wider range of solutions to be considered to solve transportation problems, including substitutes for physical travel. Access is affected by three factors.

Land use

Land use can significantly affect access. Higher density, mixed-use areas have better access because of increased proximity between destinations. In a more accessible area the same errands may require much less travel and may be performed easily without a car. Higher densities also affect transport choice by increasing demand for transport services, which tend to have economies of scale.

Mobility

Mobility refers to movement of people and goods. Conventional transportation planning focuses primarily on mobility, and well-developed evaluation techniques have been developed for some modes, particularly automobile and transit.

Mobility Substitutes

Telecommunications and delivery services are examples of mobility substitutes. These are likely to become increasingly important, and so should be considered in analysis of transportation options.¹⁶

¹⁴ Litman 2001 p.2

¹⁵ Litman 2001 p.3

¹⁶ Litman 2001 p.4

3 Multi-modal research findings on inter-urban transport

3.1 Corridor estimates

The description of marginal costs in different traffic situations shows that the evidence of country-specific average cost values is rather limited or might be misleading under particular circumstances. As an attempt to overcome this problem, corridor applications of short run marginal costs of passenger and freight transport can be examined. The analysis of these case studies provides the opportunity to draw a more realistic picture of the magnitude of marginal external costs for different modes of transport. The case studies do not intend to provide a totally comprehensive set of optimal externality charges and hence typical vehicles and loading rates are chosen for a selected number of uni-modal and inter-modal travel alternatives.

3.1.1 The corridors

Four European corridors have been selected, for which the marginal costs per passenger or per tonne of freight are calculated. The main alternatives considered in passenger transport are car, traditional and high speed rail and air transport (including car access). In freight transport, road haulage, accompanied and unaccompanied rail transport and waterborne transport are considered. Due to their limited importance, bus and motorcycle traffic on the passenger side and LDV and air freight transport are not included in the analyses.¹⁷

Paris-Vienna (long distance passenger transport)

This case study aims at comparing the marginal costs of a long distance car trip to traditional rail and air passenger transport. The route has a total length of approximately 1440 km, the railway route is estimated to be 60 km shorter. The vehicles used are an ordinary petrol car (Euro-I standard) which is occupied by 1,9 passengers, an electric powered international passenger train (UCPTE electricity mix, occupancy 248 passengers) and an average aeroplane, loaded with 149 passengers. For the access to and from the airports in Paris and Vienna, a journey of 20 km each way via densely occupied urban roads is assumed.¹⁸

Paris-Brussels (short distance passenger transport)

This case study compares a typical high speed railway link with road and air traffic. The distance of this corridor, approximately 300 km, is considerably shorter than the route Paris-Vienna and it is assumed that the use of air transport is less useful than in the previous corridor.

Cologne-Milan (combined trans-alpine freight transport)

The case study aims at comparing the land-based freight transport modes road (28t and 40t HDV), rail (container transport including initial and terminal

¹⁷ INFRAS/IWW p.135

¹⁸ INFRAS/IWW p.135

shipments by HDV, 50 km at each origin and destination) and the rolling motorway (from Basel to Chiasso) to each other. The corridor has a length of about 860 km on the road and 920 km by rail. In road haulage two types of HDV are considered: a 28t lorry running through Switzerland and a standard 40t lorry taking the route via France (+140 km). The initial and final transport for unaccompanied combined rail transport and the use of rolling motorway are calculated for the 40t lorry. The abolishment of the Swiss 28t limit is not considered.

Rotterdam-Basle (uni-modal harbour-hinterland freight transport)

The purpose of this case study is to compare the land based uni-modal freight transport modes to inland navigation. For rail transport, which again represents a container shipment, neither initial nor terminal shipments from and to container terminals by road haulage are considered. The loading rates of the direct freight train is assumed to be considerably lower than the loading rate of a trans-alpine container shuttle (see Cologne-Milan). In inland navigation a typical share of 50% empty headings is assumed.¹⁹

3.1.2 Corridor estimates conclusions

- The relative marginal costs of road transport are much higher than rail and water transport
- In general, inter-modal passenger or freight transport is worse than single-mode mass transport alternatives (rail, air without road access) due to the high external costs of road transport
- As far as passenger and freight transport is concerned the loading factors of vehicles are more decisive for relative costs passenger or ton kilometre than slight technical advantages
- In road transport, the share of urban roads is a driving element of the level of external costs (even excluding congestion)
- In air transport the travel distance has a great impact on the relative marginal external costs per km

The results should not be generalised as the underlying corridor applications reflect only a small sample of marginal external costs and their variation with respect to varying traffic situations.²⁰

As far as passenger transport is concerned, railway is still the means of transport with the lowest level of external costs, although in this approach the values are significantly higher than in previous studies. Within freight transport, rail and waterways transport are sharing this position. The comparison shows the relevance of different cost categories as well. It is not surprising that the better known externalities (accident, noise) remain rather stable, whereas the risks of air pollution and climate change has led to increased costs. One important reason is that research in natural science, in emission data procedures and in cost estimation has focused on these issues over the past years. Health costs and future climatic changes are in particular rather new research fields. This effect will hold on. It is possible that in the future new risks will have to be integrated in cost estimations.

¹⁹ INFRAS/IWW p.136

²⁰ INFRAS/IWW p.146

Considering a trend growth, total and average costs will increase, despite of improved productivity and technology. Because the trend of traffic growth will hold on and increase total pollution levels in different areas. The willingness to pay (the care for scarcity, security and nature) will increase and will lead to higher unit values. Productivity will increase in the future for all transport means, but in different directions. Some specific effects might offset the positive impacts. In passenger transport for example increased motorization and new forms of (more individual) leisure transport might lead to lower occupancy rates, and increasing average costs. In freight transport similar effects are possible with increased degrees of globalisation and increased requests for logistic chains.²¹

3.2 Possible Designs of inter-urban road pricing schemes for heavy goods vehicles (DESIRE)

The objective of work package 2 of the DESIRE (Designs for Interurban Road pricing schemes in Europe) project is to provide a sound theoretical foundation of possible designs for inter-urban road pricing schemes (IRPS) for heavy vehicles. Design elements of IRPS are analysed in a broad sense incorporating technological and procedural aspects as well as institutional and financial elements and possible impacts of IRPS. The report referenced here has not been formally accepted by the European Commission yet (27.09.01).

3.2.1 Fundamentals and dimensions of analysis

A consistent analysis of the conceptual foundations of IRPS requires a common basis. This concerns the objectives and basic forms of IRPS, the pricing principles and, most importantly, the functionality of an interurban road pricing scheme.²² The following main types of objectives have been identified to justify the introduction of road tolls:

- Financing a transport network upgrading or expansion program (including privatisation of roads as an instrument for public budget relief)
- Internalising external effects of transport
- Management of traffic flows (to fight congestion or even contain demand growth)
- Fair competition among transport modes (allowing for cross-subsidies between transport modes)

The choices about price levels, price variability and price incidence depend on the weight these objectives are given and determine the adequate basic form of IRPS. In order to define the basic forms of IRPS it is differentiated between the following two classes:

- Distance related schemes
- Access and/or dwell time related schemes

The basic types of IRPS are derived from these two classes and depend on three variables: the infrastructure subject to a charge, the vehicle differentiation and the time dependency of the charge.

²¹ INFRAS/IWW p.156

²² ECOPLAN et.al. p.6

It is not disputed that short run social marginal cost pricing maximises social welfare. The criticism of social marginal cost pricing does not concern this efficiency approach per se, but issues as the cost recovery of transport, the privatisation and financing of road infrastructure or problems of implementation of the social marginal cost approach.

In the real world there are difficulties to implement the social marginal cost pricing principle one to one because:

- it is difficult to calculate social marginal cost precisely
- a highly sophisticated electronic fee collection system is necessary
- marginal cost pricing may make privatisation of road infrastructure more difficult.

Therefore, the principle needs simplifying in order to build a feasible pricing scheme which can be implemented at low costs.²³

A structured overview of the functionality of an IRPS is the most important common basis for the analysis of technical and institutional solutions. The underlying deliverable explains in detail the system functions of an IRPS, differentiating between three main parts:

- General set-up and preparation of the system
- Operation of the system
- Auditing the performance²⁴

3.2.2 Institutional design elements

The main objective is the production and assessment of different ‘institutional’ or ‘organisational models’ for IRPS schemes. Two main dimensions that could help defining institutional models were identified:

- 1) Is there any private investment in the infrastructure, with corresponding construction and revenue risks (Yes/No)?
- 2) Who is in charge of the technical procedures for transactions (identification, classification and collection) (Public/Private)?

The option for Yes in the first question is normally associated with the need to engage private funds for infrastructure investment (thus obtaining a relief of the State budget for other purposes), whereas the option for Private in the second question results from a political orientation in the sense of private management of public services, related to the objective of higher operational efficiency (and sometimes of accounting transparency)²⁵.

3.2.3 Adaptation of findings to the European situation

When assessing IRPS and institutional models with regard to their feasibility, economic impacts and acceptability in a European context, different initial situations must be taken into account. The following six groups contain 24 criteria that were identified to differentiate between country-specific initial situations:

²³ ECOPLAN et.al. p.7

²⁴ ECOPLAN et.al. p.8

²⁵ ECOPLAN et.al. p.10

Objectives of IRPS: These criteria describe the major (political) objectives that may be the reason to introduce an IRPS for HGV. The feasibility of the different IRPS depends on these objectives as not every IRPS is suited equally well to meet one or several of them.

Legal and institutional Framework: Especially in the short run, existing legal restrictions will restrict the feasibility of some of the IRPS.

Geography: The impacts of an IRPS will differ between countries with either a central or peripheral location or with the population density.

Economic Structure: The economic impacts of an IRPS depend heavily on the economic structure of a country (such as e.g. the relevance of transport intensive sectors).

Transport Infrastructure: The quality and density of the transport infrastructure as well as the density of land use around the motorways are criteria of important influence on the feasibility of some of the technical and institutional solutions discussed.

Culture: Finally, the cultural dimension plays an important role when determining the feasibility of different IRPS, e.g. existing motorway tolling, the quality of the public administration or the sensibility with regard to data protection.²⁶

3.3 Road user charges for Heavy-Duty-Vehicles (HDV)

3.3.1 Requirements for an environmentally orientated road user charge for HDV

The German Government has decided on August 15th 2001 to introduce a kilometre-based charge for the use of German motorways with heavy-duty vehicles (HDV), beginning in January 2003. This charge will be obligatory for all vehicles and vehicle combinations with a gross permissible weight higher than 12 t and will substitute the Euro-vignette system, which has been valid since 1995. The average charge will be fixed by a governmental directive, and the Ministry of Transport, Housing and Construction has decided that the charge should lie between 27 and 37 DPf per vehicle kilometre. The average charges will be differentiated according to the number of axles and the Euro emission categories of the vehicles.²⁷ The objectives of charging HDV are:

- A fair allocation of the cost of infrastructure to the users as a starting point for a general change of the infrastructure financing system which includes more charges and less taxation.
- The creation of incentives for the economic use of existing capacities of the transport infrastructure.
- A fair allocation of burdens among domestic and foreign transport haulage firms.

²⁶ ECOPLAN et.al. p.13

²⁷ Rothengatter/Doll (a) p.4

Although the European law sets strict limits for the design of charges on the base of the costs for construction, maintenance and operation of transport infrastructure a closer look reveals some potential for an environmental design of the pricing system. The German Federal Environmental Agency has launched a study to evaluate the possibilities and the probable consequences of different charging structures which has been given to the Institute of Economic Policy Research of the University of Karlsruhe (IWW). One of the focuses of this study is to investigate the legal possibilities for an environmental design of a pricing system. IWW has developed different charging scenarios which have been analysed with respect to their impacts on transport and environment. In the focus of the IWW analysis there are short and long-term potentials for improving environmental quality through an HDV charge, as well as the implementability and possible side effects of such a measure.²⁸

The estimation of potential market reactions following the introduction of a road user charge for heavy duty vehicles are partly confirmed by the actual development in Switzerland. After the introduction of the km charge in January 2001 growth of traffic volume on transit routes is only slightly slowed down compared with the development of the past. Already before the introduction of the charge a concentration of the transport haulage firms could be observed in form of mergers and alliances to foster rationalisation.

A further observation from Switzerland is that the demand for access links to the railway network has increased and that new road vehicles are ordered to replace old technology. According to experts, these reactions lead to over-capacities for both transport modes which might effect a further drop of freight transport rates. As the road transport is more flexible and elastic experts estimate that the partial shifts of transport from road to rail will cease and rationalisation within the road haulage industry will be the dominating effect of the Swiss pricing policy.

Considering this the following conclusions concerning the different magnitudes and structures of charging regimes on German Federal Roads can be drawn²⁹:

1. An introduction of a user charge on HDV of 25 DPf. /vehkm which is limited to the network of motorways will not lead to significant welfare improvements. The environmental impacts of such a measure balance out so that this measure can be regarded as a first step of a long term strategy which intends to charge the whole Federal road network.
2. The introduction of a higher charge of 40 DPf. /vehkm on the whole Federal road network will lead in the first instance to an internal adjustment within the road haulage sector, if the quality of rail and shipping modes is left unchanged. The rationalisation of transport operations and a change of replacement strategies to increase the share of environmentally efficient vehicles will lead to an improvement of the environmental state.
3. A combination of the higher charge (40DPf. /vehkm) for the whole network of Federal roads with a significant improvement of the level of service of rail freight transport will lead to considerable diversion from road to rail and an improvement of the state of the environment. However, the results of this study concerning the diversion effects until the year 2010 are much lower than

²⁸ Rothengatter/Doll (b) p.1

²⁹ Rothengatter/Doll (b) p.11

the optimistic estimations presented in the context of preparing the Federal transport master plan.³⁰

4. The present study has analysed the impacts until the year 2010. Until this year not all adjustments and reactions will have run through the system if the financial stimulus of the charge is held up continuously which means that the charge is increased at least by the inflation rate year by year. Under this assumption, the long-term feedback processes between transport costs, inventory holding and spatial distribution of production locations will work, which leads to a further bundling of freights movements in particular on long distances in Europe. If these feedback processes become strong enough due to an active support by public transport policy then the overall impacts can be much higher than those simulated in this study. Therefore the intention of the German Government to double the freight transport of the railways until the year 2015 should not be treated as a pure illusion. But it has to be understood that the adjustment mechanisms which could lead to such a result differ widely from the assumption that the transport movements over space will be left unchanged and the only reaction of the market will be a strong diversion from road to rail. On the contrary, major structural changes of spatial distribution of production and inventory holding as well as changes in logistic strategies of production industries will be basic pre-conditions for such a development. One effect will be that bundling of goods transport is fostered on long transport distances such that rail and inland waterway shipping become more attractive for the shippers. The second effect will be that the road transport on small and medium distances will operate with higher loading factors and more efficient round-trips and routings. To achieve such patterns in the freight transport market user charges have to be extended to the whole road network and have to be designed high enough as well as differentiated in a way that they continuously stimulate the rationalisation of transport operations and the use of environmentally friendly technology.³¹

3.3.2 Aspects of the HDV charges in Germany

As of January 1. 2003, it is intended to introduce user charges for HGV, proportional to the distance travelled on the federal motorway network. October 2001 is the deadline for deciding which operating agency will be responsible for this new venture. Any form of delay by a quarter implies a potential loss in revenue of a minimum 1 billion DEM. The selection of a suitable system will play a decisive role in this project. The impact of levying user charges and the gradual switch from the traditional way of financing the state budget to a system based on user finance will be of great importance, too.³²

Except for the question of when and how, there are several more questions about the impacts of the toll, the use of the toll revenues and the perspective of charging.

One of the expected impacts is a shift of traffic from the motorways to smaller roads if exclusively the motorways are charged. But this effect will be only marginal as long as the charge is dependent on the route costs. The other welcome

³⁰ Rothengatter/Doll (a) p.100

³¹ Rothengatter/Doll (b) p.12

³² Kossak p.412

effect shall be a shift of transport volume from road to railways and waterways. The problem here is the limited capacity of railways and waterways so that they could only put up with a 40% increase of transport volume and especially on the main transport corridors where the biggest shift is expected, the alternative railways are closer to their capacity limit.³³ Nobody should expect the collapse of the road transport system as it has been predicted since the 60's. The road transport system and road logistic are extremely adaptable. Railways have to concentrate on their own strengths and should not expect a shift of transport because of charging.

The revenues of charging should be used only for the improvement of the road infrastructure or in multi-modal main corridors which are closely related. The use of that fee as a fee and not as a general tax will raise acceptance in the society and build a large consensus about the positive aspects of road charges. External costs are not included (only costs for road infrastructure) in the actual discussed fees for distance based road charges although its recommended that they be.³⁴

The decision as to which technical system will be used has to concentrate on the question if it does not have to be a system which can be expanded in the future to be used for all roads and for all road vehicles because distinguishing roads and vehicle classes is not logic and it is expected in the future that a distance based road pricing will be introduced for all vehicles and roads.

As a perspective for road pricing, there should be made efforts to:

- the charge of all modes of transport and roads
- use the charge revenues (if orientated on the infrastructure costs) for the infrastructure sector where they were gained
- reduce traffic taxes in the scale of today's use of tax revenues for traffic infrastructure³⁵
- develop a fully automatic road pricing with European standardized and harmonized equipment and granted interoperability

3.3.3 Additional general aspects of road pricing

The round table 118 paper of Izquierdo and Vassallo deals with the economic objectives of introducing tolls on intercity road transport infrastructure. The conclusion the authors come to is that tolls are a basic instrument for securing infrastructure financing, outside of the public budget. In this context, an independently financed concession system is crucial whose aim would be to use infrastructure construction as an instrument of countercyclical policy in periods of economic recession. Moreover, having infrastructure as when it is needed, enables society to avoid costs deriving from the unavailability of public funds to finance infrastructure.³⁶

³³ Kossak p.408

³⁴ Kossak p.409

³⁵ Kossak p.410

³⁶ Izquierdo and Vassallo p.24

An essay of Rietveld deals with pricing intercity road transport and with the experiences in the Netherlands in particular. One of the aspects he underlines is that the treatment of transport costs as a deductible in the income tax leads to major distortions: a low variable cost for commuting, a zero variable cost for the company car, and a negative cost in the case of private car use for business purposes. The conclusion is that discussion on fair and efficient pricing should not only address the issues concerning the differentiation in the present taxes on car ownership and car use, but also the removal of distortions caused by the structure of the income tax.³⁷

3.4 Railway, net access, route price formation, relation of infrastructure and transport service

3.4.1 Net access and route price formation in the West-European railway

The guidelines of the RL 91/440/EEC³⁸ for net access are implemented in the EU-member states and in Switzerland today. But the guidelines of the RL 91/440/EEC were an early compromise solution for the liberalisation of railway markets. A number of member states grants significantly more net access rights than planned in the RL 91/440/EEC. Liberal regulations exist especially in Germany, the Netherlands and Sweden. The British railway reform has an exceptional position because of the franchising system and complex regulation structures and cannot be compared in all respects with the railway reforms of other states. In the EU member states Austria, Belgium, Luxemburg, France and Italy in fact no net access for third parties exists. Despite of diverging political statements those countries have in common a strengthening of the existing monopolies.³⁹

The intra-modal competition of railways is retarded by several restraints. Market access is basically difficult because of the high fixed costs in the railway sector and the former states railway companies have economies of scale which make it difficult for new companies to operate not only in market niches. New competitors have to cooperate with the former monopolists. Informal problems and unfavourable general conditions are often more problematic than legal problems or provable discrimination.

The route price level is mainly determined through national targets concerning the grades of cost recovery. More degrees of freedom have the infrastructure managers for their decisions about route price structure especially concerning the question if a fixed price component should be raised or if quantity discounts should be granted. Because of the (not explicit formulated but in fact because of the private structure of the DB Netz AG existing) demand to recover the costs of infrastructure completely (desisting from the investment grants of the German government) the route price level in Germany is high by international comparison.

³⁷ Rietveld p.3

³⁸ Council directive 91/440/EEC of 29th July 1991 on the development of the Community's Railways COM (1999) 616 final, Brussels 25.11.1999. Supplementing guidelines 95/18 and 95/19 which relate to the permission of railway companies respectively to the assignment of track capacity and the calculation of route prices.

³⁹ Meyer-Rühle et.al. p.85

There are essential differences concerning the route prices in Austria, Switzerland, Germany, France, Italy, Netherlands, Sweden and United Kingdom:

- in the basic philosophy (marginal cost versus full cost recovery)⁴⁰
- in the charging of fixed price components additional to train- or ton-kilometer dependant variable portion
- in the use of the different possible pricing criterions (for example not in all countries the degree of infrastructure abrasion is sufficiently taken into account in route pricing)
- in the catalogue of the services which are covered with the basic price, in the pricing of station stops (station fees) and in the usage of additional services (energy supplement, shunting, use of sidings...)
- in the price differentiation between passenger and freight traffic

Even if a powerful regulation authority exists, the integration of infrastructure management and railway traffic divisions into one company must be a hinder to competition because it produces many conflicts between division and company. The raising of the transport capacity of a competitor is an interest of the infrastructure society which gains additional marginal income to the fixed infrastructure costs but not of the company which might lose own traffic revenues. Only in Sweden and the United Kingdom really independent infrastructure carriers can be found.

Despite the railway politic initiatives of the EU-commission are focussed on the liberalisation of cross-border traffic, until now hardly any new international traffic services are offered on the market. There is no overall responsibility for the transport source-destination and the technical options for interoperability are barely used. The price-performance-ratio is much worse in international traffic than in inland traffic of the single countries.⁴¹

Even in countries where net access over the guideline 91/440 is possible another problem appears for railway traffic companies: the route prices are in general defined and published but not all services that the customers of infrastructure companies can expect. This especially concerns the net quality: if for example the possible train speed is reduced because of infrastructure lacks, the railway transport companies cannot expect the prices to be reduced in the same way. On the other hand in certain cases there are services which they have to pay but do not need.⁴²

3.4.2 Charges for the use of railway tracks – a case of discrimination?

At the start of the year 2001, the DB Netz AG introduced a new linear rate system for the use of rail tracks (TPS'01) as a replacement of the earlier two-part tariff TPS'98. This change resulted from a case involving the Kartellamt (Germanys Cartel Authority), that dealt with the question of the TPS'98 discriminating

⁴⁰ Meyer-Rühle et.al. p.86

⁴¹ Meyer-Rühle et.al. p.87

⁴² Meyer-Rühle et.al. p.88

against third parties and obstructing the privately-owned rail companies' access to the rail tracks.

Based on the commendable efforts made to secure more business for the railway system as a whole by offering different track access charges to customers it has highlighted the fact that the Kartellamt proceedings were not correctly focussed on the issue at stake. The problem was not that the track charges prompted discrimination against third party access to the rail tracks but whether the obvious market domination of the DB Netz AG gave rise to discrimination in so far as competitors were concerned.

By referring to the outcome of competition- and economy-related cases, there is no evidence of discrimination due to the fact, in the absence of proper regulation of the rail network, that there is no reason for the DB AG to prevent third parties' access to its rail tracks.⁴³

There is no doubt that the DB Netz AG owns conditional on the net technology a monopole for the track market because the railway infrastructure is a monopolistic bottleneck. It would be inefficient to duplicate the infrastructure on a certain route. Because of that, the market share of the net carrier has to be 100% and the DB Netz AG has opportunities to deny or allow access only at very high prices to certain railway companies. It is just the question if there is any motivation for DB Netz AG to do so.

For the DB Netz AG there is an economic stimulus to reach a higher degree of cost recovery through more traffic on the tracks. It will not exclude customers as long as they contribute to the fixed cost recovery.

Incentives to prefer "transport sisters" within the group to prevent them from reduced revenues can not be explained out of a competitive economic view.

Economic reference models state that monopole profits can be skimmed on one market just one time. A monopolist who owns the relevant input factor for railway tracks will obtain all possible monopolistic surplus profits through access fees.⁴⁴

There are no incentives to obstruct competitors on the downstream markets and to close these markets. The goal of the company is to gain the monopolistic profits of those who request transport services. The independent transport companies, whether they are bound to the net carrier or not, are giving the higher prices further to the consumer.⁴⁵

3.4.3 TPS'01 first critique

One must see to it that the new rate system for the use of railway tracks has got no shortnesses with regard to competition. It seems that there are some reasons to believe that the new rate system is still discriminating against newcomers compared to the transport companies out of the Deutsche Bahn AG group.⁴⁶

For the tracks which are mostly requested by newcomers, the prices have specifically increased and – vice versa – for the tracks where there will be only weak competition within the next period the prices have decreased. Further on, there is a scope for decisions in the route price system to prefer the transport companies out of the DB AG group (for example: When is a freighttrain route a standard or an express category?). There is a lot of non-price discrimination

⁴³ Berndt p.202

⁴⁴ Berndt p.201

⁴⁵ Brunekreeft p.29

⁴⁶ Ewers/Ilgmann p.5

potential (for example: Can a route be constructed for the newcomer or not?). Beyond there is the varying granted information about the effects of the route price system. The transport companies out of the DB AG group could contribute in the run-up to the new route price system. The competitors on tracks were informed only 10 days before the new price system became effective and could not claim their requirements. Considering this DB Netz has discriminated against the competitors through the route price system before it was announced. The critique mentioned above could go on and on as long as DB Netz is an integrated part of the DB AG group. The conclusion is that infrastructure has to be separated institutionally from transport services to enable a non-discriminating intra-modal competition in the railway sector.⁴⁷

3.5 Options for a more efficient use of time niches at airports (slots) in the EU

Today the slots in the EU are held by a relatively small group of airlines. Free time niches are predominantly assigned by the grandpa-principle: it means that the airline gets a slot it had already owned the previous period. Basic principles of the assignment are the IATA-guidelines. The most important are:

- commercial traffic is prior to non-commercial, military or irregular flights
- grandpa-rights as historic priorities are valid if the flight plan changes too
- longer operating times, whole year traffic is preferred

Out of an economic view this system is evidently inefficient:

- the slots are not allocated to the airlines who would pay the most (allocative inefficiency)
- the system prevents the market entry of newcomers (airlines) on attractive airports and reduces in the long run the efficiency pressure on the old settled offerers (competitive inefficiency)⁴⁸
- the benefits resulting out of the scarcity of slots are not given to those (airports) who have the capability to solve it in the short or long run (infrastructural inefficiency)

Resulting out of this slot allocation system, scarce existing infrastructure capacities of airports are not used as efficient as possible. The question is to know whether the slots are used at all (no shows) and what is about the productivity of the assigned slots (passengers per slot). Furthermore the airlines can not give potent signals through their demand within the actual regulation system to adjust the existing airports capacities to their and the customers needs.⁴⁹

Attempts to improve the allocation of starting and landing capacities through scarcity prices were not successful in practice. Combining the theory with the actual political discussion in the EU enables to make a proposal that gives the following recommendations:

⁴⁷ Ewers/Ilgmann p.6

⁴⁸ Ewers et.al. p.1

⁴⁹ Ewers et.al. p.2

1. Introduction of a capacity surcharge on overloaded airports with the guideline for the airport carriers to invest additional earnings in the enlargement of the airport capacity. If he can not prove he has spent it this way within for example five years he has to pay back the fees. Accepted measures are:
 - a. constructional extensions
 - b. costs for the planning
 - c. compensation of affected residents, compensation for air traffic noise caused reduced values of real estates, air pollution protection, generous and early landscape fosterage, active and passive noise protection, welfare maintaining surrogate-investments (sports facilities etc.)⁵⁰
 - d. research development and use of technological and organisational innovations for raising the slot use
 - e. improvement of the airport connection to the regional traffic system and to other airports
2. Charging of a global start and landing fee component to cover the fixed costs. This reservation fee has to be paid even if the airline does not use it (no shows). The remaining variable part of the fees is lowered to a level where it only covers the variable costs.
3. All slots are only temporary given for five to eight years to an airline. The airline has to give away every year a certain percentage of the owned slots into a slot-pool (x%-rule). Out of this pool the slots are auctioned. The auction earnings shall be used for the improvement of the airport.
4. Implementation of elements of slot trade. A restricted slot trade is planned which combines kinds of leasing with a time limit (using an aggravated use or lose rule) and secures the real use of leased slots. Slot trade gives the airlines inter- and intratemporal flexibility. With options and futures they can buy rights for slots in future periods which are not in the pool already.

Benefits of the suggested measures

- The passengers benefit of the more intensive competition between the airlines and the raised efficiency of slot use through lower ticket prices and a demand orientated offer of flight services⁵¹
- All airlines benefit from an abandonment of grandpa-rights and a liberalisation of the access to airports:
- The airlines have new opportunities in all EU-countries, old bastions of the grandpa-airlines are accessible for newcomer-airlines
- In the short to middle run the grandpa-airlines will probably lose some income at their places. But they do benefit of the new opportunities of competition at all EU-airports
- The surrounding of the airports and the residents benefit of a resource saving and efficient use of scarce airport capacities. Through risen traffic at constant airport capacities there are impulses for the local economy and employment
- Airports have the opportunity to use the existing infrastructure capacities efficiently

⁵⁰ Ewers et.al. p.3

⁵¹ Ewers et.al. p.4

3.6 Differences in the use of aircraft and land-bound vehicles

The technical sophistication of aircraft places greater demand on pilots than in the case of ordinary land-bound vehicles. The following operating conditions are worthy of note:

1. When airborne, an aircraft can not slow down – let alone stop flying – in the case of an emergency
2. An aircraft's speed is very high both on the ground and in the air
3. The six "Freedoms of the Air" have to be observed
4. The technical performance potential of an aircraft is very high as is the cost of carrying the required amount of fuel
5. There are significant variations in weight during an aircraft's flight
6. It is necessary to reduce the commercial load of an aircraft from a certain distance due to the amount of fuel needed. Air transport has, in spite of the complex parameters listed, succeeded in establishing itself on either equal, or even better, economic and technical terms with surface means of transport⁵²

Compared to land-bound traffic air traffic has more difficult operating conditions regarding the vehicle handling, the energy consumption, noise emissions and the warranty of a high transportation safety. But there were achieved good results that show with land-bound traffic comparable (noise and energy) or remarkable better (transport safety) specific values. That becomes significant concerning the use of vehicles, the primary energy consumption (dependent on speed), noise emissions and transport safety which is much higher in the commercial air transport than in land-bound traffic.

Whilst person transport has been established in air transport for decades is the goods transport still in starting position. Besides the high speed an indisputable advantage of air transport is that the operation of vehicles, airports and safety procedures are set in accordance with international validly rules.⁵³

4 Conclusions

Research has put a lot of effort into solving the problems which arise from the attempt of reforming inter-urban transport pricing. However, no study was conducted to try and give an overview about the external effects of the different modes of transport on inter-urban routes in general. In order to collect information one must select research results concerning specific aspects of the whole complex. The studies have shown where policy makers need to be open-minded concerning different transport options and where the implementation of new concepts might be difficult.

Key problems arise from the attempt of reforming inter-urban transport pricing. The best progress in implementing inter-urban transport pricing has been achieved in the road sector. The introduction of a distance based road user charge for heavy good vehicles in Germany in 2003 is a step forward to put the EU-policy into practice. Despite some difficulties, the base for implementing this reform is more optimal than in the case of air and rail transport for road infrastructure was never that close to operation as railways (partly originated in the technical

⁵² Schesky p.143

⁵³ Schesky p.145

preconditions). Road transport has always been organised individually. Indeed, that leads to well known problems like congestion. But on the other hand, road transport, unlike rail and air transport, does not have to face the structural, system immanent problems which result from the operations. The outlined problem to secure competition on rail tracks shows that pricing reform is not just the problem of finding the “right” price but to overcome the structural and personal barriers that hinder fair competition. The same problem arises for the air transport sector. Slots are not given to the airlines who pay most but to those who are preferred by grandpa principles or not. Auctioning the slots would result in more efficient prices for flights.

The approach of the German charge for HDV does not take external effects of road traffic into account. Until now “only” the costs for the use of infrastructure shall be covered. For the extension of user charges to cover infrastructure costs and external effects, it could be advisable to wait until the systems for road charging have been introduced and established. The experiences with spending the revenues and consumer acceptance will be valuable knowledge for further steps in pricing external effects of transport modes.

It is not easy to determine which system or mode of transport is the most favourable for inter-urban transport since the inter-urban pricing reform must also take into account other factors than a pricing scheme.

The questions which should be kept in mind are: How can we overcome structural barriers in the transport sector? How can we value transportation choice? Will the air transport sector increase for goods in the future like it has done for passengers in the past? How do infrastructure policies determine and interact with transport choice? Which general conclusions to compare transportation choice can be made based on corridor estimations? For which purpose are the user charges spent in fact?

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