

A new European Directive for Road Pricing

Discussion and Consequences

Liedtke, Gernot and Anselm Ott

IWW, University of Karlsruhe

October 1st, 2003

Keywords: EU Regulation, Road Network

JEL-Classification:

Contact Details:

Institute of Economic Policy (IWW), University of Karlsruhe

Kaiserstraße 12

D-76131 Karlsruhe

Germany

Tel: ++49 – (0)721 – 608 – 4544 / – 4415

Fax: ++ 49 – (0)721 – 608 – 4963

E-mail: liedtke@iww.uni-karlsruhe.de

A new European Directive for Road Pricing
Discussion and Consequences

Abstract:

The EU plans to introduce a new directive for road pricing, which shall update directive 1999/62/EC.

In a preliminary cost calculation, the effects of the new directive on the calculated infrastructure cost will be examined. In a second step, the consequences on the user charges by vehicle category will be deduced. In the German case, the user charges would significantly decrease.

In the last part of the paper, the long-ranging results of the introduction of the presented directive will be discussed.

I Introduction

In 1999 the EU introduced the directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures. Infrastructure charges can be raised on motorways and highways with four or more lanes. Exceptions can be made for bridges, tunnels and mountain roads. Furthermore there are exceptions for countries with no or only a minor network of motorways.

The user charges should cover the costs of construction, operation, maintenance and the extension of the network. A differentiation was allowed for following parameters:

- (i) “vehicle emission classes, provided that no toll is more than 50 % above the toll charged for equivalent vehicles meeting the strictest emission standards;
- (ii) time of day, provided that no toll is more than 100 % above the toll charged during the cheapest period of the day.”
[1999/62/EC, § 7]

A modus of breakdown costs between lorries and cars is not delivered with the existing directive. Concerning external effects the final provisions of the directive allows every member state to attribute an extra amount of the user charge for environmental protection. A calculation of further external effects, e.g. monetary consequences of accidents, is not included in this directive.

In Summer 2003 a proposal for a new directive of road pricing appeared. The proposal contains some severe changes in comparison to the directive of 1999. The most important new elements are:

- (i) For the first time, a precise cost calculation scheme is given by the directive,
- (ii) the costs shall include external costs (accident costs),
- (iii) instead of capital costs, real monetary flows should be basis of the calculation,

- (iv) for infrastructures older than 15 years, only the running and maintenance costs shall be considered (because the “capital is already paid”) and
- (v) costs for administration and the toll-collect system shall not be part of the infrastructure costs.

II Content of the proposed new directive

To get an overview of the new road directive, several points of the road directive should be clarified in the following chapters.

The costs of infrastructure

The new directive includes detailed statements of the costs, which can be credited in the cost calculation. In principle, costs for construction incl. capital costs and maintenance can be included. In comparison to the old directive, there is a differentiation between public and private operators.

Public operators are allowed to calculate capital costs only for infrastructure, which has been built in between the last 15 years. Infrastructures older than 16 years would be attributed – according to the directive – a net value of zero. The reason for this approach is the argument that old infrastructure is already paid by the users in terms of taxes and tolls.

In distinction to public owners, a private company is allowed to capitalize all infrastructures, incl. infrastructure older than 15 years. This is due to the fact that depreciation periods are often longer than 15 years and because of the fact that the private company still has to serve its capital debts.

In addition to the above-mentioned points, private companies are allowed to add a premium for risks in their calculations. This is caused to the fact of a given uncertainty of the flow of income. Nobody can predict the exact amount of users for the lifetime of a motorway.

The cost calculation is possible using the national accounts (in the case of public ownership) or by the accounts of the private companies.

External effects

The directive 1999/62/EU allows the member countries to set higher charges in sensitive areas, e.g. the Alps region or the Pyrenees. The new directive keeps this approach.

In addition, the proposal suggests a comprehension of the not covered costs of accidents. Partly these costs are paid by insurance companies, but quite a reasonable amount is paid by social security systems of the particular society. Following costs should be included:

- (i) Repair and refund of vehicles,
- (ii) administrative costs of authorities,
- (iii) medical care,
- (iv) physical damages and
- (v) loss of human and production capital.

Costs already covered by the insurances must be deducted. Following table gives an idea of the dimension of the accident costs to be expected:

Tab. 1: Costs of accidents (per lorry and per 100 kilometers)

	Location	Euro (1998)
lorry < 3,5 t	Lissabon, Tajo-Brücke	6,0 – 6,9
lorry > 3,5 t	Finnland	5,6 – 7,3
lorry > 3,5 t	Lissabon, Tajo-Bridge	8,5 – 9,3
lorry > 3,5 t	the Alps region	1,1 – 2,3
lorry > 3,5 t	Europe	1,1 – 2,1
Hgv	Sweden	5

sources: High-level-Group, PTREN

Two important points must be kept in mind:

- (i) The main part of these costs is the willingness to pay of the relatives to avoid the accidents and
- (ii) most of these costs stem from the light and middle (not fatal) accidents.

Who has to pay?

All lorries on the Trans European Network (TEN) have to pay a certain amount. Definitions and coverage varies widely between the existing and the proposed directive.

In the new directive the infrastructure charge affects all lorries with an overall weight of more than 3,5 tonnes. This is a significant change to the directive 1999/62/EC, the former directive can only be adopted for lorries with an overall weight of more than 12 tonnes. Two justifications can be found in the proposal:

- (i) Even small lorries are responsible for deterioration and demolition of roads.
- (ii) And – more important – these vehicles are also responsible for congestion.

The Trans European Network (TEN) is the foundation where infrastructure charges can be raised. The network within the definition of decision 1692/96/EC of the European Parliament consists of 60.000 kilometres motorways, highways and other roads. All these roads plus some evasion routes can be charged. Nevertheless, according to the principle of subsidiarity, member states are allowed to raise infrastructure charges on other roads. This is important for pre-accession countries, which have no upgraded road network according to the EU standards. This is also a possibility to prevail lorries from taking the secondary network.

Differentiation of the user charges

There is only a weak relationship in the existing directive between road usage, causes of traffic jams and external costs. In the proposed directive there are extended possibilities for a brought differentiation between the type of lorry, the time of journey and the chosen route.

The main parameter for differentiation is the length of a trip, measured in kilometres. Furthermore it is important where the journey takes place. Sensitive areas can be priced significant higher than other regions elsewhere. The same method can be used for network sections with a high accident risk.

A certain role plays the geography: Roads in urban areas are more expensive than roads in rural regions (however, the user specific costs are much lower). And roads in northern Europe are more expensive because of provisions caused by strong winters.

Important for pricing schemes is the configuration of the road network. A better equipped road network leads to higher capacity, less accidents and shorter travel times. These advantages are achieved by significant higher cost, which have to be beard by all users.

In comparison to the existing directive, more importance gained the technical data and equipment of the vehicles. Differentiations should be made between the

overall weight, the amount of axles, the kind of suspension, emitted noise and pollution.

Further differentiations can be made between peak time and off peak times. The results should lead to lower congestion in peak times by making off peak times more attractive.

Utilization of charges

The proposed directive underlines the principle that money should be spend for operation, maintenance and investments at the infrastructure itself and improvements in the traffic sector. Member countries are not allowed to spend the money for their general budget outside the transportation sector.

Especially in sensitive areas the money should be uses for financing alternative modes of transport with lower negative impacts on the health of residents and environment.

III Cost calculation

The IWW studies for infrastructure cost calculation and separation always focus on calculating the full costs of infrastructure for traffic. The Second emphasis is the process of a “fair” allocation of costs. “Fair” in this environment means that there is a comparable framework for all modes of transport. There is no coverage of external effects.

IWW Infrastructure cost calculation model

At the IWW, a cost model has been build up for calculating infrastructure costs for the federal highway and road network. The data model consists mainly of following elements:

- (i) Database: The basic database consists of the GIS-Coded federal network. The dataset for the links consists of following

information: number of lanes, year of construction and topographic indications. The links are identified to the nodes by which it is possible to access the regions (federal states). Additional engineering works such as bridges or tunnel are also coded in an appropriate way.

- (ii) Traffic flows: The traffic charge on each link is given by the user category. From this data, the harmonised 10 tonnes axle equivalent can be deduced.
- (iii) Unit costs for the replacement of infrastructure elements. These costs are differentiated by the German states, the topography and the number of lanes. Prices for the land are differentiated by the density of inhabitants and the region. All cost values have been deduced from recently build infrastructures and from other engineer studies.
- (iv) Data describing the state of the infrastructure (lanes, bridges). These indicators give an additional information about the life expectancy of infrastructure parts and therefore about their net value and the expected replacement year.
- (v) Parameterised functions describing the aging process of infrastructure components (so called “master functions”. These functions enable a forecast of the replacement expenses as well as the annual value losses.

The infrastructure cost calculation program calculates link by link, bridge by bridge, etc. the annual depreciation and – by the net-value of the infrastructure – the imputed interests. The different cost elements are described in the annexe tables. For the cost allocation on the user categories, the costs are firstly assigned to the following cost categories:

- (i) Axle-load dependent costs,
- (ii) capacity dependent costs,
- (iii) user group specific costs (HVG and rest) and
- (iv) not weighted costs (km –dependent).

For finding the adequate cost category for each cost element, following questions have been answered: How would this cost rise, when adding an user of a certain category? How would the cost develop when the lorries stop taking the road? The damages as well as the adequate dimensioning of the road elements have been discerned.

These costs are the allocated to the user groups. For example, for the first category the driven kilometres are weighted with a 3rd power function. For assigning the costs of the second category, a lorry counts for four cars.

Two main adaptations have been necessary: Capital costs of infrastructure older than 15 had to be separated from the costs of new infrastructures and a new allocation scheme for the maintenance cost was introduced.

Adaptation on the new EU directive on the German highways for the year 2003

As the new directive is sometimes very contradictive and leaves space for interpretations, a minimum and a maximum scenario (referring to the HGV costs) have been calculated.

Maximum Scenario:

- Imputed interests are possible for infrastructures younger than 15 years. The interest rate is 6%.
- Costs that are proportional to the capacity are allocated by the capacity use of different users.
- Costs, which would have been necessary for maintaining the infrastructure on a constant good level, are the basis for calculating the maintenance expenses.

Minimum Scenario:

- It is not allowed for the federal government to use imputed costs.

- Un-weighted allocation of all user groups (only km-dependent)
- Real maintenance expenses as a basis for calculating the 2003 infrastructure costs.

In contrast to the cost calculation for the German ministry of housing and transportation, the traffic flows on the roads have been roughly estimated using internal model results. The costs are assigned to the user categories on an aggregate level. These costs are allocated to the user categories. Following pondering factors are applied:

Tab. 2: Pondering factors

Category	ASSHO- factor	factor 1:1	factor capacity	factor maintenance, operation	
< 3,5 t	0,0001	1	1	1	1
3,5....12 t	2	1	2	2	3
12 t	6	1	4	4	3

Source: IWW

Results

Minimum Scenario

In the following table the infrastructure costs for the German motorway network are summarized. In addition, the assignment of the different cost elements to different cost categories are shown. The minimum scenario interprets the proposed directive in the most favorable way for the transportation sector.

Tab. 3: Costs and assignment of different elements (Mio. EUR)

		depreciation	interest	expenses	sum	factor ASSHO	factor 1:1	factor capacity	factor mainte- nance
infrastructure parts older than 15 years	maintenance (*)			289,3	145	100			
				71	36	100			
				5,3	3		100		
				123,6	62		100		
				368,2	184		100		
infrastructure parts younger than 15 years	capital costs	16,9	0		17		100		
		34,7	0		35		100		
		20,8	0		21		100		
		19	0		19		100		
		20	0		20		100		
		78,8	0		79		100		
		45,6	0		46		100		
		5,9	0		6		100		
		6,5	0		7	100	100		
		76,5	0		77				
	maintenance								
all highways	operation			454,4	454				100
	administration			908,7	909				100
				289,3	145	100			

Tab. 4: Calculation of the final user charges (minimum scenario)

(ct./km)	ASSHO-factor	factor 1:1	factor capacity	factor maintenance	costs
< 3,5 t	0,0	0,3	0,0	0,5	0,8
3,5....12 t	0,2	0,3	0,0	1,5	2,0
>12 t	0,7	0,3	0,0	1,5	2,4

Maximum Scenario

As in table 3, the following table presents the infrastructure costs for the German motorway network. In addition, the assignment of the different cost elements to different cost categories is shown. The maximum scenario interprets the proposed directive in the most unfavourable way for the transportation sector.

Tab.5: Costs and assignment of different elements (Mio. EUR)

		depreciation	interest	expenses	sum	factor ASSHO	factor 1:1	factor capacity	factor maintenance
infrastructure parts older than 15 years	maintenance (*)			564,1	564	100			
				138,5	139	100			
				10,3	10			100	
				241	241			100	
				717,9	718			100	
infrastructure parts younger than 15 years	capital costs	16,9	65,8		83			100	
		34,7	135,4		170			100	
		20,8	62,4		83		100		
		19	28,5		48		100		
		20	14,4		34		100		
		78,8	307,2		386			100	
		45,6	178		224			100	
		5,9	28,3		34		100		
		6,5	7,8		14	100			
		76,5	91,8		168			100	
		maintenance							
all highways	operation			454,4	454				100
	administration			908,7	909			100	
				564,1	564	100			

Tab. 6: Calculation of the final user charges (maximum scenario)

(ct./km)	factor		factor		costs
	ASSHO-factor	factor 1:1	capacity	maintenance	
< 3,5 t	0,0	0,1	1,0	0,2	1,3
3,5....12 t	0,8	0,1	2,0	0,5	3,5
>12 t	2,5	0,1	4,1	0,5	7,2

IV Discussion

A severe change in the new directive is the strong concentration on real cash flows. This makes sense for private companies, which can display monetary flows in their balance sheets. Normally, public owners do not have such balance sheets for infrastructure, because infrastructure is paid from the general budget – it is not possible to locate a certain asset of infrastructure, which is linked with a special part of public debt.

This dilemma is well known in European institutions. In consequence, this led to differentiation between private and public companies. Private companies are allowed to bill their full costs of the complete infrastructure plus an additional premium for risks in their business. Public companies are only allowed to calculate capital costs for infrastructure younger than 15 years plus running costs for operation and maintenance. The argumentation of EU officials is that infrastructure older than 15 years is already paid by users in form of taxes.

The above mentioned calculation led to significant lower user charges in countries with an old, public financed road network. An example of the consequences for the German motorway network is shown in the calculations above. Compared to a full cost basis with complete capital costs the possible amount of charges can shrink by more than 50 percent. Changes will be much lower in countries with a (mainly) private financed motorway network, e.g. France or Italy. There, the supplements of external costs will lead to higher charges than today. In addition, the separation

between costs of infrastructure and cost for external effects – especially accidents – is a crucial aspect.

In a public company, elements of infrastructure have a value of zero after 15 years. This short period will lead to a time of depreciation much shorter than the technical lifetime. In consequence, there will be huge differences between of total costs between new and old infrastructure elements. Completely confusing is the situation at partly modernized element, e.g. an extension from four to six lanes. Is the public allowed to raise user charges for the new lanes only or is this still an old infrastructure, which is already paid.

When considering only the real cash flows, a surprising effect will emerge. After about 20 – 30 years, a major overhaul is necessary. User generations before and after these reconstructions pay nothing whereas one generation pays. Discontinuities of the user charges could emerge.

The next problem is the calculation of the maintenance costs. If the middle expenses for maintenance would be the basis of the cost calculation, how to deal with cases like Germany, where we had a deficit in the maintenance. A negative spiral between not undertaken maintenance and the impossibility to raise capital would be the result. Or consider a private company in the first years of its existence: in this period, a low level maintenance is necessary. But how to raise the user charges after some 10 years?

A next open question is the use of the accident costs. As these costs are in the same dimension as the infrastructure costs, who will get these costs? If it is the infrastructure company, upgrading measures would be possible. A positive spiral could result, bringing more capacity and more security.

Because of the contradicting positive and negative spirals, the directive does not at all support sustainable financing and maintenance strategies.

V Conclusions

The draft of the new road directive has following main aspects [DVZ, 2003, p. 11]:

- (i) User charges should be calculated the same way in every member state of the European Union. Costs for construction, maintenance and operation plus (not by insurance covered) costs for accidents can be added up.
- (ii) Differentiation between private and public owner structures in the field of capital costs.
- (iii) The member countries can bill different charges concerning the criterias type of lorry, region and time.
- (iv) All lorries with an overall weight of more than 3.5 tonnes have to pay.
- (v) In a first step, the focus of the new directive is the Trans-European Road Network (TEN). Further roads can be added.
- (vi) The user charges should be used only for transport infrastructure. A transfer of the money to other sectors or the general budget is not allowed.

The proposed directive has some positive aspects, which are real improvements in comparison to the existing one. An important aspect is the extended user differentiation. Another point is the aim for a common substructure for calculating costs. Both aspects can lead to a fairer cost allocation.

Negative consequences can be found as well. With implementation of the proposed directive, there are strong incentives for states with a public infrastructure to transfer their transportation network in private structured companies, e.g. Austria with the ASFINAG, because of the “real-cash-flow” approach in the new directive. With the implementation of the directive, public owners are not allowed to calculate and charge the full costs of the complete infrastructure. Only private structured companies have an equilibrium between expenses (incl. capital costs) and revenues. But in the

long range, users of the infrastructure eventually have to pay higher charges, because of higher interest rates and a risk premium for uncertain traffic flows in future.

REFERENCES

1999/62/EC, European Parliament: 'DIRECTIVE 1999/62/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 June 1999 on the charging of heavy goods vehicles for the use of certain infrastructures', Brussels.

n.n., 'EU mit Wegekotenrichtlinie auf Irrweg', *Deutsche Verkehrs Zeitung (DVZ)*, September 25, 2003, p. 11.

n.n., 'Vorschlag für eine Richtlinie des Europäischen Parlaments und des Rates zur Änderung der Richtlinie 1999/62/EG über die Erhebung von Gebühren für die Benutzung durch schwere Nutzfahrzeuge', 2003, Brussels.

Rothengatter, W., 'Revision der Richtlinie 1999/62/EG über die Erhebung von Gebühren für die Benutzung bestimmter Verkehrswege durch schwere Nutzfahrzeuge – Kurz-Stellungnahme', 2003, Karlsruhe.