

Marcus Einbock \*

## THE INTRODUCTION OF THE AUSTRIAN TOLL SYSTEM FOR TRUCKS – EFFECTS ON COMPANIES

*This paper deals with effects of the Austrian road pricing system on enterprises. Trucks are charged per kilometre driving on Austrian motorways with the amount depending on the number of axles. Therefore, enterprises whose trucks use motorways are confronted with higher transport costs. These costs can be generally divided into direct and indirect ones. The main cost categories concerning indirect costs are costs for pre-financing, for bad debts losses and for toll-control. In this contribution these kinds of costs are assessed and the cost effects in different industries are evaluated. Further, empirical evidence based on a survey conducted in June 2005 is included, where Austrian enterprises were asked about their assessments concerning consequences of road pricing on their company.*

**Keywords:** road pricing toll, consequences on enterprises, Austria, effects on costs, strategies.

### 1. Introduction

The idea of charging the transport infrastructure is very old. [7] The usage of special roads was combined with paying a fee already in ancient times. [3,12] Today, two kinds of toll systems can be distinguished. On the one hand, there exist a lot of time-dependent road toll systems. On the other hand, kilometre-based road pricing systems will become more important in future. Time dependent toll systems are characterised by the right to use a defined road network within a certain period. For influencing behaviour of road users, these time-dependent fee systems are not sufficient. They do not discriminate between frequency and temporal-local demand of road users. [10,11] In contrast to this kilometre-based road pricing systems are able to regulate demand on a road network in a better way. Such kilometre-based systems can be already found in freight and/or passenger transport in some European countries, i.e. France, Italy or Slovenia. [4] Perhaps the most prominent one is the “Leistungsabhängige Schwerverkehrsabgabe” for all trucks on all roads in Switzerland, established in 2001. In Austria, a kilometre-based system for trucks was introduced in January 2004, with Germany following in 2005.

### 2. Description of the Road Toll System in Austria

The era of kilometre-based road pricing started at the beginning of 2004. The government decided upon the implementation of a kilometre-based charging system on all motorways for trucks from 3.5 tons maximum weight on in 2002. As shown in Table 1, the fees range in amount from 13 Cents to 27.3 Cents per kilometre and are dependent on the number of axles.

These Austrian road fees are the highest ones within the European Union. In comparison with Germany, the Austrian fees are

Amount of road fees in Austria (exclusive 20 % VAT) Table 1

	2-axles	3-axles	4- and more axles
Category	2	3	4
Amount	13.0 Cent / km	18.2 Cent / km	27.3 Cent / km

2.23 times higher for trucks with four or more axles. Moreover, crossing the Alps (i.e. via Brenner, Tauern-motorway, Arlberg-motorway) come along with further tolls and duties for trucks. Unlike Germany, emission classes of vehicles are not considered in this present charging system. But it's expected that a more ecological design of Austrian road fees considering different external costs will happen in the nearer future. This would deliver incentives for buying vehicles with less pollutant emissions. [9]

The charged roads in Austria are depicted in Figure 1. Revenues are disposed for reconstruction and extension of motorway network all over Austria. The enlargement of the European Union in May 2004 reinforced the necessity of investments in the Austrian motorway system. For example, there is up to now no direct motorway link from Vienna to the Austrian-Czech border or to the nearby Slovakian capital Bratislava.

The charging process is based on the microwave-technology. The fundamental components are portals located between two exits of the motorway and the OBU (on-board-units) attached at the front-window of the vehicles. The portals send signals by microwave and if a vehicle passes a portal, the signal will be send back for registration. The registration data will be transferred to a central server recording the process.

\* M. Einbock

Institute of Transport Economics and Logistics, Vienna University of Economics and Business Administration, 1090 Vienna, Austria,  
E-mail: Marcus.Einbock@wu-wien.ac.at

### 3. Kind of Consequences on Austrian Enterprises

#### 3.1. Overview

The kilometre-based charging has several effects on enterprises in Austria. First of all, a new kind of costs arises – charges for using motorways which in turn contribute to transport costs. Further, companies react to their changing environment and take measures in order to reduce logistics system costs. In the following the most important effects will be discussed focusing on the consequences on costs, competitive ability and on the planning system of companies.

For the assessment of these direct and indirect consequences, an empirical study was conducted in June of 2005, 17 months after the road pricing system came into effect. The survey was carried out in co-operation with the Austrian Federal Chamber of Commerce. Over 1.000 companies were chosen for a structured sample of companies from economic sectors, which regarded to be heavily influenced by kilometre-based charging systems. Enterprises were

asked about their assessment of consequences on their company. Within the sample industrial enterprises, trading companies and logistics service providers were considered. At the end, 105 companies took part in the survey, whereof 3 forms could not be taken into further consideration, as the answers therein were not plausible or valid. The respondent's affiliation were for 46 industrial enterprises, 38 traders (wholesalers and retailers) and 47 logistics service providers (forwarders or carriers), multiple answers were possible.

#### 3.2. Effects on Costs

As already indicated above, accounting of companies using the Austrian motorway system is confronted with a new type of costs, the toll charges. These costs are a component of transport costs which can be separated between direct and indirect ones. Direct toll costs are expenses resulting directly from the payment of the charge determined by the number of axles and the distance on the charged roads. They are emphasised in current discussions



Fig. 1. Charged motorways in Austria, source: ASFINAG

about charging in practice. Indeed, this kind of costs seems to be the predominant part of toll costs. But companies are confronted also with indirect costs which are not negligible. [6] Indirect toll costs are costs arising for logistics service providers and shippers, which are no direct toll costs but stand in a close relationship with the charging process. In general they can be divided into three categories:

- costs for pre-financing,
- costs for bad debts losses and
- costs for toll-controlling.

Indirect toll costs arise either permanently or one-time whereas costs for pre-financing and for bad debts losses belong to the permanent cost category. Regarding the costs of toll-controlling, there exist cost-types pertaining to permanent or one-time costs.

Costs for pre-financing will typically arise if the time of out-payment for goods or services is earlier than the date of in-payment. It is a form of bridge-financing resulting from the late in-payment of customers. In Austria, customers usually pay transport costs up to 60 days after shipment. The out-payment occurs regularly about 10 or 14 days after carriage in the widespread post-paid-procedure. So there is a need to finance the time-gap between the two dates. Generally costs for pre-financing correspond to costs for an overdraft credit. Costs for pre-financing amount about 2 to 3 % of the direct toll costs in Austria.

Costs for bad debt losses are a second important component among the multitude of indirect toll costs especially borne by freight forwarders and carriers. If a carrier for example transports goods for a customer and after the transport the customer will go to insolvency, the carrier will have to bear basically all the direct costs for this special customer. Due to this fact, it is necessary to consider the risk of bad debt losses including full / partial depreciation, administration costs, and insurance costs, too. All in all, costs of bad debts losses account to less than 0.1 % of direct costs in Austria. This cost type is consequently less important. One of the reasons for such a low figure is an overall high probability of shipper's in-payments.

The third category covers the costs for toll-controlling. Toll-controlling deals with all processes regarding setting aims, planning and monitoring resulting from the implementation of the kilometre-based charging system. The general goal of toll-controlling comprises the keeping of the management abilities for co-ordination, reaction and adaptation despite charging-induced changes in the environment of companies. The implementation of toll-controlling is especially relevant for logistics service providers confronted with high direct toll costs. As the profit margin in the Austrian logistics service sector is very low with an average of the net operating ratio of 0.24 % [13], the establishment of a toll-controlling-system is recommended.

Direct and indirect toll costs lead to higher transport costs. The increase of transport costs vary considerably between indus-

try sectors, as Table 2 shows. The study documented a wide range from average 4.3 % in the construction industry and materials and up to average 10.1 % increase in paper and printing. In general, the average among industrial enterprises is 8.2 %. The reason for such a relatively wide span seems to lie in different needs for transport. In addition to this heterogeneous logistics systems are established in the branches. The structure of the fleet, the kind of transport (short distance vs. long-distance), the fraction of road transport of overall transportation in a company or the real utilisation of the fleet are all components influencing the increase of toll-based costs.

Road toll based increase of transport costs Table 2

Industry	Increase of transport costs
Earths, Stones, Ceramics	9.3 %
Construction industry and Materials	4.3 %
Paper and Printing	10.1 %
Wood	9.5 %
Food and Beverages	6.1 %
Trading Companies	5.3 %
Logistics Service Providers	9.1 %

Bearing all the additional costs alone can significantly reduce the profit margin and the financial results.

If companies give the additional toll costs to their customers, the sales-price for goods will rise. That seems to be an important point as opponents of such road pricing systems in politics refer to negative effects on prices. The average rise of sales-prices is shown in Table 3.

Average increase of sales-prices in different branches Table 3

Branch	Average rise of sales-prices
Industrial Enterprises	1.2 %
Traders	3.5 %
Logistics Service Providers	7.0 %

Companies see clearly sales-price increases. Especially logistics service providers estimate a pretty strong average rise of 7.0 %. This shows clearly their cost burden. However, these figures state nothing about price changes for the ultimate customer. As companies are involved in supply chains, the effect on final sales-prices can only be estimated. A precise examination of supply chains and the transport links between the stages in the supply chain is required to find out price changes for the ultimate customer. Another method would be the use of Input-Output-Tables for estimating price changes. An estimation on the basis of such tables revealed minor changes between 0.09 and 0.63 % for Austria. [5]

### 3.3. Effects on Competitiveness

Charging of road infrastructure means also consequences for the competitive ability. Competitiveness can be improved or deteriorated. But there are a lot of enterprises too, seeing no changes in their competitive ability. The shifting of competitiveness can be discussed for four different levels:

- opposite to Austrian competitors in Austria,
- opposite to Austrian competitors outside Austria,
- opposite to foreign competitors in Austria and
- opposite to foreign competitors outside Austria.

This differentiation allows an exposure of discrepancies according to the considered level. It can be assumed that there exist differences regarding the reference object. The results concerning the levels are to be seen in Table 4 for industrial enterprises.

Regarding Table 4, industrial enterprises supposed different effects on their competitive ability dependent from the kind of level. Most respondents realised no significant changes on their competitiveness - only their position related to foreign competitors outside Austria is realised explicitly to worsen. About 40 % of the

companies assume a negative influence on their competitiveness in export. This shows that the enterprises saw a deterioration of their ability to export products, as they see that the price of products will rise to a not-acceptable level leading to a decrease in demand. Their foreign competitors do not have to bear the additional toll costs; that is why they saw this level negative. The spreading indicates also, that general statements assuming a global decrease in competitiveness are absolutely wrong. A further point is the estimation of some enterprises realising an increase in competitive ability. It is explainable by the fact that certain companies are much nearer to the customer than the domestic or foreign competitors resulting in advantages for delivery. Otherwise this shows, that most of the companies do not consider the road pricing system as a protective tariff.

### 3.4. Effects on Planning Systems

Defining adequate goals for minimising the total costs with corresponding strategies is especially relevant for companies having a high fraction of transport costs on turnover and a strong toll-based increase in transport costs. Minimising the toll-based increase

Expectations about the change of competitiveness for each level, industrial enterprises

Table 4

Level	Strong improvement of competitiveness	Improvement of competitiveness	Constant competitiveness	Worsening of competitiveness	Strong worsening of competitiveness
Opposite to Austrian competitors in Austria	0 %	3 %	74 %	20 %	3 %
Opposite to Austrian competitors outside Austria	0 %	0 %	76 %	17 %	7 %
Opposite to foreign competitors in Austria	0 %	0 %	74 %	20 %	6 %
Opposite to foreign competitors outside Austria	0 %	3 %	57 %	20 %	20 %

Importance of strategies in the field of transport and packaging, industrial enterprises

Table 5

Strategy	Very probably	Probably	Medium probably	Less probably	Im-probably
Reorganisation of transport logistics	6 %	25 %	25 %	19 %	25 %
Intensified using of non-tolled roads	9 %	6 %	30 %	21 %	34 %
Intensified using of non-tolled vehicles	3 %	21 %	12 %	12 %	52 %
Intensified using of smaller, lower tolled vehicles	3 %	12 %	9 %	30 %	46 %
Intensified using of bigger vehicles	10 %	13 %	10 %	23 %	44 %
Transfer to other transport modes (Railway)	6 %	18 %	12 %	18 %	46 %
Intensified co-operation with other shippers	0 %	0 %	25 %	19 %	56 %
Intensified outsourcing of transport services	15 %	12 %	18 %	21 %	34 %
Intensified using of non-returnable packaging	3 %	6 %	3 %	21 %	67 %

of total logistics system costs cannot be equated with minimising toll costs. Pursuing just minimising toll costs does not necessarily mean a minimisation of increase in logistics system costs, as they could possibly rise other cost types in the logistics system. A frequency-reduction of road transport for example leads to a decrease in toll costs, but on the other side a rise in inventory and storage cost arises, apart from longer delivery times (Concerning this kind of total cost thinking see [1, 2, 8]).

Definition of goals is a prerequisite for planning strategies. Concerning road toll system there exist a lot of possible strategies to diminish increase in logistics system costs:

- Strategies in the field of procurement,
- Strategies in the field of distribution,
- Strategies for improvement of the location structure in logistics networks and
- Strategies in the field of transportation and packaging.

All these kind of strategies can support a minimisation of total logistics system costs including toll costs. Especially the last strategy group can help to reduce logistics system costs.

As Table 5 shows, the importance of different strategies in the field of transport and packaging is very variable for industrial

enterprises. Strategies like reorganisation or outsourcing are relevant for some companies. Other strategies like cooperation with other shippers or intensified using of non-returnable packaging play only a minor role for industrial companies.

#### 4. Summary

In January 2004, a road pricing system on all motorways was introduced in Austria. All vehicle (trucks and buses) from 3.5 tons overall weight have to pay a certain fee extending from 13 Cent/km to 27.3 Cent/km. This road toll system leads to different effects on enterprises in Austria. At first accounting is confronted with a new cost type. Toll costs can be separated into direct and indirect toll costs. Both result in an increase of transport costs depending on the industry. Higher transport costs can have an influence on the competitive ability in Austria and in foreign countries compared to inland and foreign companies. It is a general goal to reduce the toll-based rise of logistics system costs which cannot be equated with minimising toll costs. Enterprises can pursue strategies in the field of procurement and distribution, changing the logistics network or in the scope of transportation and packing.

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