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REPORT

A kilometre tax for heavy goods vehicles – impact on the Swedish haulier industry

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Summary

This report is focusing on how an introduction of a kilometre tax for heavy goods vehicles in Sweden will influence the transport industry in general and the hauliers in special. The report is describing an attempt to categorise different types of hauliers which exist in the Swedish haulier market, and a sample of haulier companies are interviewed to partly validate the categorisation. The study concludes that a kilometre tax, designed according to the proposal made by SIKA, will increase the base cost of road transports with between 6-21%. Vehicles driving short distances every year will of course be less affected. The cost estimation shows that a kilometre tax might improve competitiveness between foreign and domestic hauliers. The interviews gave the impression that the proposed tax will not affect business conditions dramatically and might improve efficiency in terms of better vehicle utilisation. The cost increase will mainly be notable for the transport buyer. To facilitate the prediction of the effects of road user charges, the categories can be used in decision support systems.

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1. Introduction

The European systems for charging HGVs are currently undergoing a change to make the users pay more correct external costs that are caused by transportation, i.e., internalisation of external costs. Until now, most systems for charging HGVs have been based on a yearly flat fee, which gives the right to use the roads for transport purposes. The current developments are towards systems that charge the users for the distance used, i.e., a kilometre-based taxation with the potential to differentiate between road type, time of usage, environmental performance of vehicles, etc. Switzerland, Austria, Germany and Czech Republic have already implemented distance-based charging systems with different objectives. A couple of other European countries, including Sweden, are investigating their road charging possibilities.

The Swedish governmental commission on road traffic taxation (VTU) proposed in 2004 the introduction of kilometre taxation liable for domestic and foreign vehicles above 3.5 tonnes [12]. The commission made suggestions regarding tax levels and differentiations. Additional investigations and a national hearing process followed and the government made a proposition to the parliament in May 2006. The parliament voted in favour of the proposition, on condition that it had to be shown that a kilometre tax would not bring any unreasonable consequences for specific regions (e.g., Northern Sweden) or branches of industry (e.g., the forest industry). SIKA (Swedish institute for Transport and Communications Analysis) was commissioned to perform this investigation and also to propose new tax levels. The investigation was finalised in 2007 [17]. Conclusion from the investigation was that in general there are small impact on production and employment by introducing a kilometre tax. SIKA did not, however, consider influence on the haulier industry.

Currently a number of studies are analysing the possible effects of an introduction of a kilometre tax, as suggested by SIKA, which will serve as decision support to the governmental decision. In our study, we particularly examine how the Swedish haulier industry will be affected if kilometre taxation for HGVs is introduced. The knowledge of how hauliers in general will be affected of kilometre taxation is low, because few studies have been performed on this subject. We are also trying to find out if hauliers will behave differently in terms of route choice and modal split. All assumptions made regarding charging condition, tax levels, liable vehicles, etc., are based on preconditions set by governmental investigations VTU [12] and SIKA [17]. Another important objective is the categorisation of the haulier market, which is important to be able to make transport policy studies.

To be able to study the influence on the heterogeneous haulier market, we suggest segmenting the market into categories and further examining the possible influence of kilometre. The approach was to segment the haulier market into several categories and to analyse each category through interviews with hauliers. Moreover, interviews with experts of the haulier market were performed, as well as a literature study, in order to gain a better understanding of the haulier market and its prerequisites.

The study is a co-operation between two projects, East West Transport Corridor and ARENA. The East West Transport Corridor is an international project that aims to develop a sustainable, efficient and attractive intermodal transport corridor in the south Baltic Sea Region. Transports in the Baltic Sea Region are dramatically growing, yet planning of transports and infrastructure is still made with national boundaries as point of departure. The ARENA project is a national project that aims to develop a road user charging system for

HGVs in Sweden. In order to create a system that takes into consideration the needs of all parties, the concept development involves authorities, future users and industry.

2. Background

2.1. The Swedish transport situation

During 2006 official statistics showed that approximately 334 million tonnes of goods were transported by Swedish registered vehicles above 3.5 tonnes within Sweden. 35 455 million tonnes kilometres and 2 396 million vehicle kilometres were performed during this period (also within Sweden) SIKA [19]. Unfortunately there are no official statistics on the amount of foreign vehicles transporting goods in Sweden. However, since road cabotage[1] is allowed from all EU countries surrounding Sweden, it could be expected that foreign vehicles performs an increasing share of transported goods on roads in Sweden. Official statistics from Denmark and Finland reports transportation to and from Sweden with in total 7.8 million tonnes of goods and 3 930 million tonnes kilometre during 2006, SIKA [19].

In southern Sweden, in the counties of Skåne and Blekinge, the amounts of foreign vehicles are probably the highest. A report published by the Swedish Road Administration shows that approximately 85% of the HGVs entering/leaving these two counties via the ports and the Öresund Bridge are foreign vehicles [24]. The counties also have a large share of transit traffic, the study shows that in average 78 % of the HGVs transporting goods through the ports have their start and final destination outside Skåne and Blekinge. The report made a comparison with old statistics and concludes that there was an increase of the total amount of transported goods through these two counties by 20 %, from 2002 to 2005. Concerning cabotage, Germany, Poland, Denmark and Holland perform most transport of this kind in this study.

Another indication on the amount of foreign vehicles is an independent measurement performed by the Swedish haulier organisation in May 2005. The measurement showed the percentages of foreign vehicles outside Töre (E4) 23.5%, Uddevalla (E6) 48.2%, Markaryd (E4) 41.5% and Halmstad (E6) 43.2% during a 24 hour period [22].

Roughly 90 % of the domestic traffic (tonne kilometres measured) in Sweden is performed with vehicles with a maximal weight above 40 tonnes [19]. In EU the maximum permitted length of trucks (including trailers) is 18.75 metres. Sweden and Finland have used an exception which allows domestic vehicles with a permitted length of 25.25 metres and a total weight of 60 tonnes [1]. Sweden and Finland have a tradition of longer vehicles and have had an exception since joining the EU. Several member states are performing trials with longer vehicles (25.25 metres), for instance Germany and Netherlands.

2.2. Available statistics and categorisations

The transport market is heterogeneous, why there exist several attempts to categorise it into market segments, which can be used when historical data (statistics) of goods flows is presented. Categorisations can be used when predictions of potential changes are made, for instance with transport models. The focus of existing Swedish statistics is mainly on the goods flows and its characteristics, not different haulier segments. Consequently, existing statistics does not fully cover the different cost structures, types of transportations, etc., of different haulier market segments.

[1] Cabotage = National road transport performed by a motor vehicle registered in another country

The Swedish haulier organisation uses a categorisation of the Swedish hauliers where certain assumptions are made regarding vehicle usage, cost structure, etc. However, this categorisation is outdated and does not match the current situation very well.

Enarsson and Lindblad [3] have made a review of the Swedish freight statistics. They define some shortcomings of the available statistics, for instance, foreign transports are not included. Moreover, it can also be difficult to couple product groups to transport flows. As an example, it is difficult to know what is loaded in containers which arrive to the ports.

Liedtke and Schepperle [10] define other shortcomings in the European transport statistics. For instance, the NST/R (Standard Goods Classification for Transport Statistics) product categories which are used in Europe does not successfully take handling and packaging categories, sector relations and good-type relations into account. Moreover, often products are not categorised in a consistent way, since the categories are not disjoint. Liedtke and Schepperle argue that there is a need to make a more consistent segmentation of the transport market, and therefore present a suggestion of a categorisation of the transport market. The authors claim that there is a need to continue the work of categorising the transport market.

2.3. Related work

There exist related studies where the effects of an introduction of a kilometre tax (or other types of transport policies) are studied. Existing research indicates that changes in modal split and route choice are limited as a consequence of kilometre taxation, but greater utilisation of vehicle capacity have been noticed were taxation (or charging) have been introduced [4], [11]. However, there are different views of how an introduction of a kilometre tax will influence the transport industry. Some studies show limited effects as a consequence of kilometre taxation [4], [11], while other studies show more significant effects [8]. It is expected that the impacts of a kilometre tax will decrease closer to the end-consumer. Liechti and Renshaw [9] show that the consumer prices have not increased significantly in Germany, Switzerland or Austria as a consequence of kilometre taxation. Moreover, it is expected that the influence of an introduction of kilometre taxation will be higher when the transport cost is large in relation to the overall cost.

The Swedish Environmental Protection Agency (the Swedish EPA) [13] analyses how different policy instruments, i.e., kilometre taxation and increased fuel tax, affect climate gas emissions and regional development. They define two categories of vehicles, one common in Sweden and one which is common in interregional transport, a rigid truck with a drawbar trailer (dolly and semi-trailer) and a tractor with a semi-trailer.

The Swedish National Road and Transport Research Institute (VTI) [25] have made a study of the impact of long heavy vehicles on the transportation system, where the competition between road and rail transport is analysed. Moreover, VTI defines five categories of HGV similar to our categorisation, where cost estimations are made. The report is to be finalised in December 2007.

In the Tango Collect project (2000-2004) [5] typical Swedish hauliers were defined to better predict the consequences for the users (i.e., divers) of a kilometre taxation system. Three categories were defined in the project, however, no cost calculations were made since this was not the purpose of the study. Our study is based upon these haulier categories.

2.4. Comments

From above it can be concluded that few studies have been conducted of how the haulier industry would be influenced by kilometre taxation. Also, there is a lack in current statistics and categorisations since they do not cover the current Swedish transport market well. To better predict the effects of a possible introduction of kilometre taxation, we believe that it is important to carry out an analysis of how the haulier industry, i.e., the future users of the system, would be affected by kilometre taxation. The study which mostly resembles our aim is the study by the Swedish EPA. However, they do not attempt to cover the major part of the Swedish haulier market, which we attempt to do.

3. Suggested Swedish haulier categorisation

To make realistic predictions of possible effects of kilometre taxation, we define groups of hauliers, or categories, with similar characteristics in this section, covering the main part of the Swedish haulier market for HGVs. Different categories will be more or less affected when kilometre taxation is introduced. The categorisation has a base in current categories used by the Swedish haulier organisation, as well as categorisations made in the Tango Collect project [5], see Table 1.

Haulage company	**Martin's**	**Åsa's**	**Kevin's**	**Piotr's**	**Olle's**
Total weight (tonne)	60	18	50	40	60
Vehicle age (years)	2	4	6	2	2
Type of transport	Long distance, often timetabled, LTL	Regional distribution, LTL	Construction, FTL	Long distance, foreign vehicle, FTL	Wood, routed tour, FTL
Distance/year (km)	180 600	40 000	50 000	183 150	179 840

Table 1 Overview of haulier categories. LTL – Less-than-TruckLoad. FTL – Full-Truck-Load

The categorisation was an iterative process, which started with a workshop together with hauliers and the haulier organisation of southern Sweden. Due to the heavy lorry fleet in Sweden, several categories represent hauliers with heavy vehicles (50 and 60 tonnes). The haulier groups are described according to distance driven per year, type of vehicle used, type of transport, etc. The outcome of five segments are estimated to represent a large share of the overall road transport market in Sweden, at least the majority of the haulier market, according to the haulier organisation of southern Sweden, experts of the Swedish haulier market and national statistics [16]. Based on the haulier categories and its characteristics, cost evaluations were made based on statistics (mainly from [16] and [18]) and own assumptions, see Figure 1. To validate the categorisation, interviews were made with eight haulier companies. Each interviewed haulier showed to have business corresponding to one or more categories. The interviews contained mainly open-ended questions and the following issues were brought up:

- The interviewed hauliers were asked to validate the categorisation, as well as describe how well their company fitted into the categories and eventually propose adjustments.

- The interviews included discussions of the cost structure for each segment concerning fixed cost, distance-based and labour cost as well as total cost per year.

- Future kilometre taxation as suggested by SIKA [17] was added on the existing cost structure of the companies to facilitate an analysis of what impact the tax would have on the different segments.

- A number of defined statements concerning the possible impact of kilometre taxation were discussed.

- We have tried to extend the description of the categories by letting the companies describe their logistical operations in more detail. This is believed to be important since Liedke and Schepperle have found a clear relationship between transport market segments and shipment size, handling categories and from-sector [10].

Below each category is described in more detail.

Martin's haulage company

Martin's haulage company performs long distance transportation within Sweden. The deliveries are often timetabled and between hubs (direct). The company's vehicles are in average 3 years old and have a high environmental class (EURO class). The usual maximum weight is 60 tonnes per each vehicle and the average distance driven are 180 000 km each year. A typical transport is between Helsingborg and Stockholm, were the vehicle is fully loaded in one direction and half-full on the way back.

Åsa's distribution

Åsa's distribution transport is a company located in Malmö in south of Sweden. The location near Copenhagen makes it possible for her company to deliver goods both in Sweden and Denmark. The vehicle fleet is registered in Sweden and is equipped with a fleet management system controlling orders and receipts among other things. The average maximum weight per vehicle is 18 tonnes and the vehicle fleet is in average 4 years old. The average distance driven per year and vehicle is approximately 40 000 km.

Kevin's gravel and construction

Kevin's gravel and construction transport company is a member of a local lorry centre. His vehicle fleet is rather old compared with the other categories, 6 years. The vehicles of the fleet have an average maximum weight of 50 tonnes. Kevin's vehicles usually don't have any kind of fleet management system installed. The yearly average distance driven is 50 000 km per vehicle.

Piotr's long distance transportation

Piotr's long distance transportation company use foreign registered vehicles, while operating in Sweden. The vehicles are usually 2 years old and the vehicles have a maximum weight of 40 tonnes. The distance driven is approximately 180 000 km per vehicle. Piotr's share of the Swedish transport market is increasing each year according to the interviewed companies.

Olle's wood transport

Olle's wood transportation company uses vehicles with a maximum weight of 60 tonnes. As many of his colleagues, Olle is using a fleet management system, to have control of his deliveries and orders, this includes GPS to locate were the raw material shall be fetched. A typical transport is fully loaded in one direction and empty on the way back from delivery. The average distance driven in Olle's company is 180 000 km per year.

4. Kilometre tax influence on hauliers

The influence that are of greatest importance for the haulier companies are the economical effects, why a cost calculation for the different haulier categories when introducing kilometre taxation was made. The cost estimations are mainly based on information from the haulier interviews and the expert interviews. The cost per vehicle in each category is divided into three parts: Staff cost, Variable and Fixed Vehicle cost. Many of these costs can be obtained from authorities (for instance taxes) and employer organisations (wages). The diesel cost was assumed to be 8 SEK per litre. The cost estimation reflects the production cost[2] for 2006 and do not include margin of profit. Furthermore, the results of the haulier interviews are presented in this chapter.

4.1. Vehicle tax

For heavy vehicles in Sweden tax is paid for both vehicles and trailers. When implementing kilometre taxation, VTU [12] suggests that the Swedish vehicle tax will be adjusted to minimum levels proposed by the European commission. EU has stated minimum levels for vehicles with and without trailer [1999/62/EG]. The directive does not, however, propose taxes for vehicles with a permitted gross weight above 44 tonnes, which implies that an estimation of the tax level for vehicles with a maximal weight of 50 and 60 tonnes was needed. Assumptions were made for Martin's (60 tonnes), Kevin's (50 tonnes) and Olle's (60 tonnes) vehicles; their taxes were calculated with Piotr's tax as reference[3]. Åsa's type is considered to have a vehicle with 3 axles and Piotr's 2+3 axles including a semi-trailer. In Table 2 the tax levels proposed by [2] plus own assumptions used when calculating taxes for Martin's, Kevin's and Olle's[4], are shown.

Haulage company	Martin's	Åsa's	Kevin's	Piotr's	Olle's
Proposed tax (per vehicle and trailer)	10500 SEK	1110 SEK	8750 SEK	7000 SEK	10500 SEK

Table 2 Vehicle tax levels when kilometre taxation is applied

4.2. Current flat fee

Sweden is connected to the Eurovignette agreement between Denmark, Belgium, Luxembourg and Netherlands. A Eurovignette paid in any of these countries is valid in the other connected countries. The fee is liable for all HGVs, which have a total weight of 12 tonnes or more. In our calculations we have assumed that all vehicles have EURO 3, which corresponds to EURO 2 in Table 3 below. When calculating cost with added kilometre tax, the road fee is replaced with the kilometre tax.

[2] The cost to produce transports

[3] 7000 SEK × 1,25 ≈ 8750 SEK and 7000 SEK × 1,5 ≈ 10500 SEK

[4] Exchange rates for calculation: 1 SEK = 9.5€ (2007-08-23). 5% increase has also been added to the tax level, according to VTU (p. 374).

Following figures are valid for 2006 and 2007 [23].

Number of Axles	EURO	Road fee (per year)
Two or three	Euro 0	8 743 SEK
Two or three	Euro 1	7 741 SEK
Two or three	Euro 2	6 831 SEK
Four or more	Euro 0	14 117 SEK
Four or more	Euro 1	12 751 SEK
Four or more	Euro 2	11 385 SEK

Table 3 Current road charges

4.3. Kilometre tax

The SIKA investigation commission by the Swedish government proposed tax levels in their final report. The tax levels in Table 4 were used when the cost estimation was made. This is also the levels used in the investigation itself. When calculating the tax in this study it was assumed all categories were of EURO3, which is a common environmental class in Sweden today [20]. A comparison with vehicles of EURO 4 and 5 were also made, see Table 4

In the report from SIKA [17] the average marginal-cost based kilometre tax has been estimated at around 1.40 SEK per vehicle kilometre. The average marginal-cost based kilometre tax for rural driving has been estimated at around SEK 1 per kilometre and at SEK 2.80 for driving in urban areas. This information is based on 2001's prices. See Table 4 for the Average tax levels (from [17] on page 51):

Total weight	Euro 0	Euro I	Euro II	Euro III	Euro IV	Euro V
3,5 till 5,9	1,54	1,07	0,94	0,82	0,72	0,66
6,0 till 7,9	1,58	1,09	0,95	0,83	0,73	0,66
8,0 till 9,9	1,62	1,12	0,97	0,85	0,74	0,67
10 till 11,9	1,66	1,14	0,99	0,86	0,74	0,67
12 till 17,9	1,75	1,18	1,02	0,88	0,76	0,68
18 till 23,9	2,23	1,60	1,43	1,28	1,14	1,05
24 till 31,9	2,37	1,68	1,49	1,32	1,17	1,07
32 till 39,9	2,54	1,77	1,56	1,37	1,20	1,09
40 till 43,9	2,66	1,84	1,62	1,41	1,22	1,10
44 till 49,9	2,76	1,89	1,66	1,44	1,24	1,12
50 till 54,9	2,88	1,95	1,71	1,47	1,27	1,13
55 -	3,03	2,03	1,78	1,52	1,30	1,15

Table 4 Proposed average kilometre tax levels

4.4. Result of cost estimation

The result of the cost estimation is shown in the following tables and graphs. When kilometre tax is introduced the base cost increase varies from 43 000 SEK to 247 000 SEK per year or between 6 and 21 %, depending on type of haulier, see Table 5.

	Martin's	Åsa's	Kevin's	Piotr's	Olle's
Base cost (SEK/year)	2 382 726	700 192	1 032 160	1 173 149	2 643 614
Base cost (SEK/km)	13	18	21	6	15
Cost including kilometre tax (SEK/year)	2 629 304	743 364	1 108 151	1 420 006	2 889 037
Cost including kilometre tax (SEK/km)	15	19	22	8	16
Actual change (SEK)	**+246 578**	**+43 172**	**+75 991**	**+246 857**	**+245 423**
Change (per cent)	**+10%**	**+6%**	**+7%**	**+21%**	**+9%**

Table 5 Base cost estimation

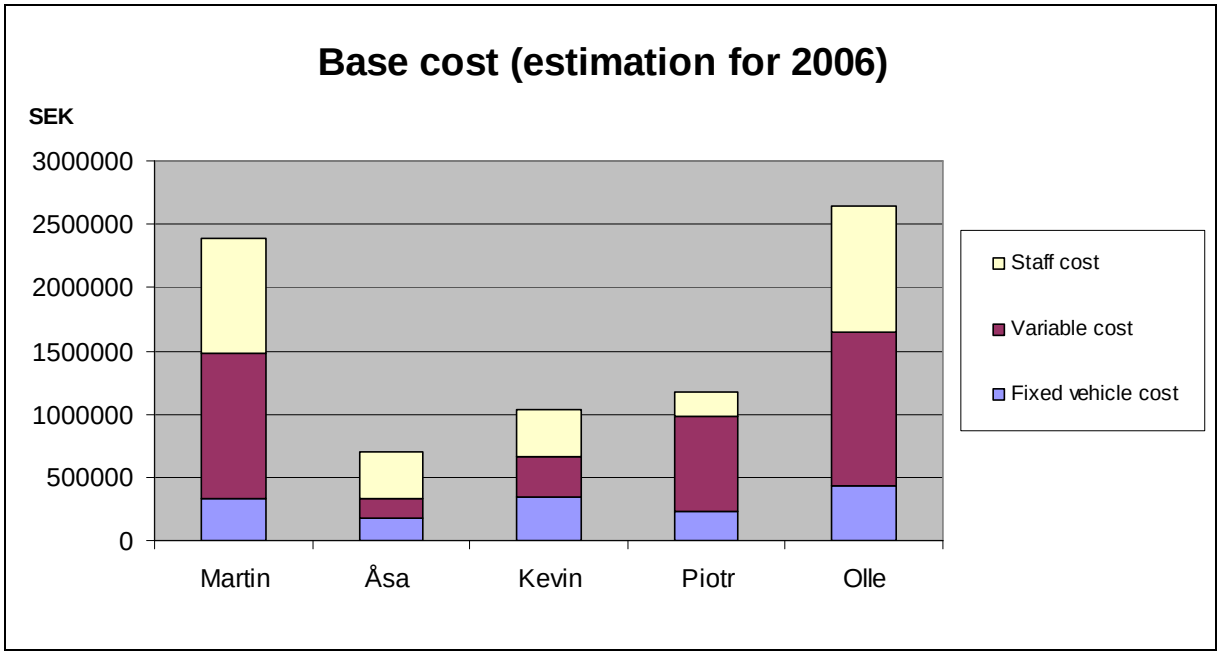

Figure 1 The base cost structure of the haulier categories estimated for 2006.

Figure 1 illustrates the share between different cost types. A kilometre tax will influence the variable costs of the hauliers.

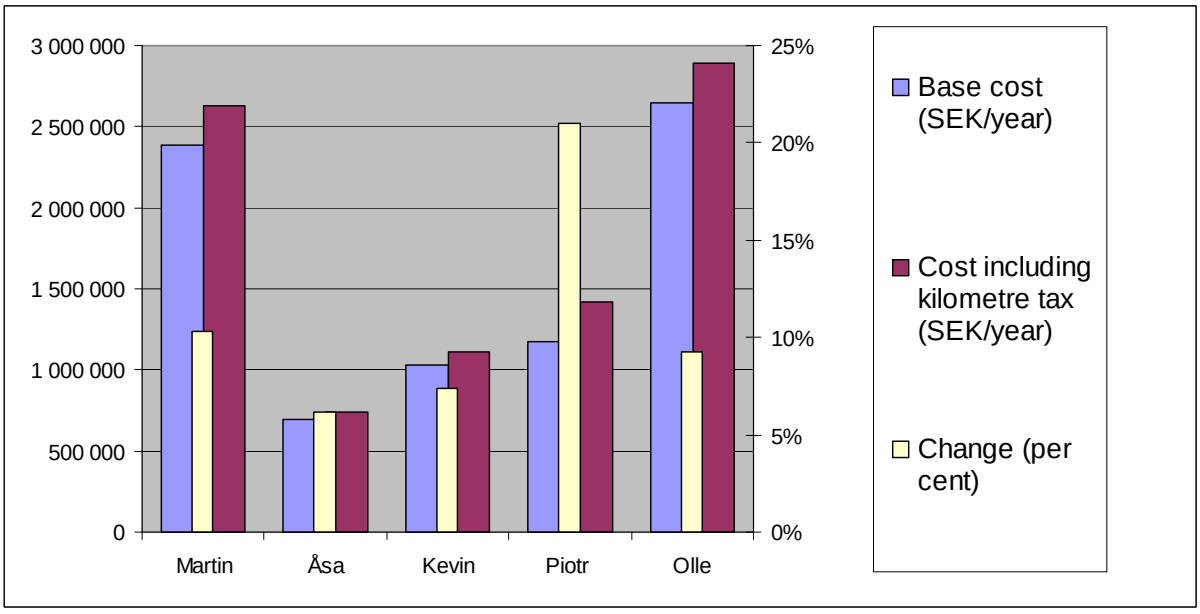

Figure 2 Comparison between base cost and when kilometre tax is introduced, EURO 3.

Figure 2 illustrates that the largest increase is noticed for the hauliers which drives the longest distance per year.

	Martin	Åsa	Kevin	Piotr	Olle
Base cost	**2 382 726**	**700 192**	**1 032 160**	**1 173 149**	**2 643 614**
Cost including km tax (SEK/year) EURO3	2 629 304	743 364	1 108 151	1 420 006	2 889 037
Cost including km tax (SEK/year) EURO4	2 589 572	737 764	1 098 151	1 385 207	2 849 472
Cost including km tax (SEK/year) EURO5	2 561 272	734 164	1 091 151	1 363 229	2 822 496
Cost including km tax (SEK/km) EURO3	14,6	18,6	22,2	7,8	16,1
Cost including km tax (SEK/km) EURO4	14,3	18,4	22,0	7,6	15,8
Cost including km tax (SEK/km) EURO5	14,2	18,4	21,8	7,4	15,7

Table 6 Cost comparison between EURO 3-5 vehicles.

Table 6 shows the cost increase for different Euro classes. The table illustrates that higher Euro class implies a lower kilometre tax, but the difference is moderate.

4.5. Result from interviews

The results from the statements concerning possible impacts of a kilometre tax are:

1. The cheapest route is always used.

The time aspect is generally more important than the cost aspect, especially for Kevin and Olle. When it is possible, the cheapest route is chosen. However, there is always a trade-off between cost and time.

2. A kilometre tax based on vehicle characteristic differentiation, gives incentives to invest in new vehicles more frequently.
Yes.

3. The price for the end-customer will increase as a consequence of kilometre taxation.
Most hauliers agreed on this. Crucial when letting the customer pay for increased costs are open relations between the partners. If detailed price information is given to the customer it is easier for the haulier to justify an increased price. Typical for the hauliers which do not believe that it is possible to let the customer pay for the kilometre taxation is a fixed price with no transparency and that the customer dominates the haulier, for instance that the haulier is a part of the customer company.

4. The transport resources will be better utilized.
Most hauliers agree that it is possible to utilize the resources more efficient. However, not everybody believes the suggested kilometre taxation levels will have an effect on this. The greatest potential for a better utilization is an increased co-operation with other hauliers and with the customer since the customer has an important influence on how it is possible to plan the resource utilization.

5. Analysis

The defined haulier categories were validated towards the interviewed haulier companies. The categories represented the situation of the hauliers rather well; however, we had to make some modifications of the categories compared to the first assumptions:

- The average distance driven by Kevin's type was set to 50 000 km per year. The first assumption was lower.

- The salary of Piotr's was increased, compared to our assumption, in the validation process.

Moreover, often Martin's and Åsa's exist in the same company since the different categories complement each other. This illustrates that the categories should not be regarded as haulier companies, but rather as haulier types.

From Table 5 it can be seen that the largest cost increase (both actual increase and per cent) as a consequence of kilometre taxation will be noticed by Piotr's, despite that the 60 tonnes categories of Martin's and Olle's have higher kilometre tax. This is because Piotr's already has a lower vehicle tax (all other categories have vehicle taxes reduced to EU minimum level). The production cost increase for the other categories is more modest, between 6-10%. The haulier types of Åsa's and Kevin's, which do not drive many kilometres each year, are naturally less sensitive to kilometre taxation.

5.1. Interviews

We have tried to find patterns connected to the haulier categories and we have got some indications for some of the statements. However, in order to find more specific characteristics, a more structured survey including more information probably has to be done, with a much larger sample. We have also tried to extend the haulier categories to include more detailed logistical characteristics, such as product value, load consolidation. This also needs to be further examined for a larger sample to draw some conclusions.

The findings from our study concerning vehicle utilization correspond to what has been observed after an introduction of kilometre taxation in other European countries [4], [11]. The hauliers we interviewed believe it will be a cost increase for the end-customer; however, it is possible that the cost increase will not be significant, like the findings in the related work.

From the haulier interviews some wishes were expressed concerning the implementation of the kilometre taxation which can be regarded as guidelines, or aspects to consider when implementing a kilometre tax:

- The purpose of the tax is important to state very clearly.
- The system has to be fair, e.g., cheaters should be stopped directly, few exceptions of included vehicles and equal tax levels for everybody.
- There has to be European interoperability.
- The collected tax should pay road maintenance and investment.

5.2. Comparisons with other studies

A comparison can be made of our cost calculation with two similar studies regarding the base cost, namely the studies of VTI [25] and the Swedish EPA [13], in order to partly validate our study.

The study by the Swedish EPA has a similar approach as our study since a cost calculation as a consequence of the introduction of the tax for different haulier categories are made. In the Swedish EPA study, two categories of vehicles are described, where one is similar to the category of Martin's. The result regarding Martin's cannot directly be compared to this study, because there are different assumptions, we assume a yearly distance of 180000 km (60000 km more per year) which result in a higher base production cost. Cost per kilometre

(SEK/km) is almost the same for our study and the EPA study, 13 and 14 SEK respectively. An evaluation when kilometre tax is applied is not possible, because old kilometre tax levels from VTU [12] have been used, but with their main result there is a production cost increase of 17 % for the vehicle type corresponding to Martin's.

The VTI study [25] calculates the base cost for five categories of vehicles transporting different goods. In comparison to our study, Piotr's and Åsa's are the only types not having a corresponding category. When the cost of long distribution transport (Martin's) is compared with our study, the difference is modest. The assumption regarding yearly driven distance is the same, 180 000 km, but there might be some differences with salaries, insurances, etc. When the haulier category for gravel and construction (Kevin's) is compared there are similarities, but a major difference is the assumed yearly distance driven which is longer in the VTI study. When wood transportation (Olle's) is considered the results from our study and the VTI study are correspondent.

6. Discussion

As mentioned in the introduction, categories of hauliers can be appropriate to use when making studies of the effects of for instance an introduction of kilometre taxation. If the categories are related to current statistics, it is possible to make predictions of certain market segments. In Sweden, detailed statistics exist concerning the product flow [18]. The product flow is for instance connected to industries, load carriers, transport modes, product values, and product flows between regions. When the haulier categories have been further examined, the haulier categories can be connected to this product flow statistics to indicate which segment of the national statistics the categories belong to.

The hauliers can belong to different types of transport chains with different types of customers, suppliers, etc., therefore it makes sense to extend the categorisation to also include other actors within transport chains to better capture different types of relations. A characteristic that is relevant to capture for typical customers is, e.g., ordering behaviour; for typical transport buyers the importance of the reliability of transports could be relevant to capture. It is also possible to define categories of typical transport chains based on the relations between actors in a transport chain. As an example, Ramstedt and Woxenius [15] have made a suggestion of typical transport chains, based on the dominance of the customer, supplier, or logistics service provider. It is possible to extend this with other characteristics such as product types, transport distance, etc. Such extended categories can be useful when making simulation studies of policy effects on transport chains.

There are several shortcomings of this study. Only a few hauliers have been interviewed and only hauliers in the southern Sweden have been interviewed. Therefore it is difficult to draw any general conclusions from the study; it should rather be seen as a first step towards a categorisation of the Swedish haulier market. Another issue is the way the categories have been defined. Categorisations can be done in several ways. Liedtke and Schepperle [10] suggest that hauliers are connected to haulier categories with fuzzy clustering. Another way of making categories is to search for common patterns in large amounts of data by making use of clustering techniques/algorithms. However, such methods require a larger sample which was not possible in this study. Moreover, to cover a larger share of the haulier market, more categories probably need to be included. We have got indications from hauliers and other experts that categories such as hauliers belonging to a company (e.g., a producer), dry bulk, farming transports and intermodal transports, also could be included in an extended categorisation.

7. Conclusions and future work

This report describes an attempt to categorise the major part of the Swedish haulier market. The categorisation has been used in a small study of how the Swedish haulier industry will be affected by an introduction of a kilometre tax for heavy goods vehicles. The study shows that a kilometre tax will increase the cost, with between 6-21 %, when SIKA's proposed tax levels (weighted average) [17] are applied. More utilisation (i.e., distance driven) of a vehicle naturally means a higher kilometre tax. The study indicates that lowering the vehicle tax when the kilometre tax is introduced will imply a higher total tax for the hauliers. SIKA [17], specifies estimations of taxes in rural and in urban areas. The usage of these tax levels for rural areas will lower the base cost for vehicles driving in the countryside when the new tax is introduced. Another method to compensate for the new tax is to reduce the energy tax. Our study also indicates that the kilometre tax might improve competitiveness between domestic and foreign vehicle, as hauliers will compete under more similar conditions. The interviews gave the impression that a kilometre tax will not affect the business dramatically, but the cost increase might improve the efficiency (better vehicle utilisation) and the increase will mainly be notable for the transport buyer.

There is a need for future work, for instance the categories need to be further validated and examined to fully cover the market. A larger sample of Swedish hauliers representing the whole country need to be examined, for instance a questionnaire can be sent out to cover a larger share of the Swedish haulier market. Also, the usability of the haulier categories need to be further studied in simulation experiments when making predictions of for instance policy effects.

The relationship between the transport buyer, forwarder and the haulier is very interesting to further study since this has an important influence on how the transports will be performed. Especially if the possibility of a modal split as a consequence of a kilometre taxation will be examined, it is important to further study how the mode choice actually is made.

8. References

8.1. Literature

1. Commission of the European Union (1996), Council Directive 96/53/EC. Official Journal L 235 , 17/09/1996 P. 0059 – 0075

2. Commission of the European Union (1999), Council Directive 99/62/EC. Official Journal L 187, 20.7.1999, p. 42–50

3. Enarsson, L and Lindblad, F., "Future freight transports. Demands of the transport buyers on the transport system". Report from Godstransportdelegationen, SOU 2000:8, Stockholm, Sweden, 2000.

4. Gustafsson. I., Cardebring, P.W. and Fiedler, R., "Road User Charging for Heavy Goods Vehicles - Overview of Regional Impact", East West Transport Corridor report, Karlshamn, Sweden, 2006.

5. Gustafsson, I. and Källström, L., "Tango Collect: Differentiated kilometre charges as a driving force for implementing telematics for heavy goods vehicles", Tango Collect, Report No. 5, 2004.

6. Hammar, H., "Consequences for the forest industry of a possible introduction of Swedish kilometre taxation", National Institute of Economic Research, Stockholm, Sweden, 2006.

7. Holmgren, J, Davidsson, P., Persson, J.A., Ramstedt, L., "An Agent Based Simulator for Production and Transportation of Products", 11th World Conference on Transportation Research, 24-28 June, Berkeley, USA, 2007.

8. Johansson, H., Öhman, J., Lundin, M., "Kilometerbaserade vägavgifter – Miljöeffekter och andra konsekvenser", The Swedish Environmental Protection Agency, Report 5273, Stockholm, Sweden, 2003.

9. Liechti M. and Renshaw N., "A Price Worth Paying – A guide to the new EU rules for road tolls for lorries", T&E publication, Brussels, Belgium, 2006

10. Liedtke, G and Schepperle, H, "Segmentation of the Transportation Market with Regard to Activity-based Freight Transport Modelling", International Journal of Logistics: Research and Applications, Vol. 7, No. 3, 2004.

11. McKinnon, Alan, "A review of European truck tolling schemes and assessments of their possible impact on logistical systems", International Journal of Logistics: Research and Applications, Vol. 9, No. 3, pp. 191-205, Taylor & Francis, 2006.

12. Ministry of Finance (2004) Skatt på väg (*eng.* Road taxation), SOU 2004:63, Proposals from Commission of road traffic taxation, Stockholm, Sweden.

13. Swedish Environmental Protection Agency ”Klimat, transporter och regioner. En studie om målkonflikter och målsynergier”, Report 5710. Stockholm, Sweden, 2007.

14. Ramstedt, L., Davidsson, P., Persson, J., Holmgren, J., “On the Use of Micro-level Simulation for Estimation of the Effects of Governmental Control Policies” 11th World Conference on Transportation Research, 24-28 June, Berkeley, USA, 2007.

15. Ramstedt, L. and Woxenius, J., “Modelling approaches to operational decision-making in freight transport chains", NOFOMA 2006, Oslo, Norway, 2006.

16. SIKA, “The cost structure and competitive situation of the haulier industry”, SIKA Report 1999:5, Stockholm, Sweden, 1999.

17. SIKA, “Kilometre tax for lorries. Effects on industries and regions”. Report 2007:2, Stockholm, Sweden, 2007.

18. SIKA, “Commodity type survey 2004/2005”, SIKA Statistics 2006:12, Stockholm, Sweden, 2006.

19. SIKA, “Swedish national and international road goods transport, year 2006”, SIKA Statistics 2007:12, Stockholm, Sweden, 2007.

20. SIKA, (In Swedish) “Transportkostnadseffekter av en svensk kilometerskatt”, SIKA PM 2007:3, Stockholm, Sweden 2007.

21. Sundberg. J., “Sweden: Distance based pricing for Heavy Goods Vehicles – A national kilometre-tax”, 2006.

22. Svensk Åkeritidning, “Fler utländska lastbilar på svenska vägar”, Vol 8, 2005

23. Swedish Tax Agency, “Road user charges (tolls) for foreign heavy goods vehicles”, http://www.skatteverket.se/skatter/fordon/vagavgiftereng.4.61589f801118cb2b7b2800010396.html. Access date 2007-08-23

24. Swedish Road Administration, “Transport of Goods through Skåne and Blekinge – Summary of main report”, SRA report 2007:9, Kristianstad, Sweden, 2007.

25. VTI, (In Swedish) ”Långa lastbilars effekter på transportsystemet”. Delredovisning 2007-06-15. Linköping, Sweden, 2007.

8.2 Interview

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Baltic State Fishing Fleet Academy
Blekinge Institute of Technology
Coordinating Council on Transsiberian Transportation
County Administrative Board of Blekinge
DFDS Tor Line
DFDS Lisco
EC Gruppen
Esbjerg Business Center
IKEA Sweden
ITS Sweden
Kaliningrad Branch of North West Academy
Kaliningrad Oblast
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Karlshamns Expressbyrå
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