THE EXTERNAL COSTS OF TRANSPORT

Follow-up and developments 2003

Summary in English

SIKA Report 2004:4

Preface

In its official appropriation document for 2003, the Government gave SIKA a renewed assignment for the fiscal year 2003 to report calculations of the external effects of traffic, after consultation with and assistance from the transport agencies and before the end of the financial year. At the same time, SIKA was given a continued commission to further develop principles and methods for how the external effects are to be taken into account in the design of infrastructure charges and other instruments, also with the assistance of the transport agencies. This report contains an account of this year's follow-up and development work.

The report contains updated calculations of the marginal costs for different categories of transport and calculations of how these marginal costs relate to the variable traffic-related charges and taxes currently levied. An interim report on current calculations of marginal costs relevant to charges with the focus on goods transport was submitted to the Government in June 2003 (SIKA Report 2003:6).

Per-Ove Hesselborn has been project manager for the marginal cost assignment. A number of SIKA's analysts have participated in the project. Anna Johansson has updated the calculations of marginal costs and degrees of internalisation and is responsible for the clarification of the marginal costs of cars. Martina Estreen is responsible for the section dealing with the ExternE model. Kristian Johansson is responsible for the review of the marginal costs of lorries and the effect calculations of various kilometre tax constructions. The section on the financing and definition of the infrastructure, on the development initiatives of the transport agencies and on the proposed revised Eurovignette directive has been written by the project manager. The section on conditions for competition in different goods transport markets has been written by Inge Vierth. Göran Friberg and Anders Wärmark at SIKA have also participated.

Stockholm, December 2003

Staffan Widlert
Director

The external costs of transport Follow-up and developments in 2003

This report is an account of the continued mandate given to SIKA by the Government to increase knowledge about the external effects of traffic and methods to persuade traffic providers to take these effects into consideration ("internalisation").

Development of transport policy

The *European Commission* presented two proposals in 2003 in the field of road charges. The first was a directive on the introduction and interoperability of electronic road toll systems. An agreement, which differs in a number of respects from the Commission's proposal, has subsequently been reached between Member States at ministerial level. This entails that electronic charge systems commissioned after 1 January 2007 on roads, highways, bridges, tunnels and ferries are to be based on short-wave communication, satellite positioning and/or GSM/GPRS communication. A standardised payment service is to be developed under the guidance of the Commission.

The other proposal concerns the development of the European "Vignette Directive". An important part of this proposal is that Member States are to be given the right to introduce charges on other roads and for other types of vehicles than those primarily referred to in the directive. This proposal also entails that the maximum charge level will be determined in a new way. Discussions at civil servant level in autumn 2003 indicate that negotiations between the Member States can be complicated. The proposal has been discussed at this autumn's meeting of transport ministers.

However, the European Commission did not present in 2003 either the long-announced proposal on a framework directive for charges on transport infrastructure.

In November 2003, the *European Parliament* rejected the conciliation proposal agreed upon by the Council of the European Union and the representatives of Parliament due to the so-called port directive. This proposal would, inter alia, have affected the conditions for pilotage charges.

In June 2003, the *Stockholm Committee* presented an interim report containing proposed legislation on congestion charges. This report has been circulated for comment and the Government Offices are at present drafting a bill containing proposals for congestion charges in Stockholm. In December 2003, the officials involved made the assessment that legislation can have been considered by the Riksdag and promulgated at the earliest by early 2005. Some time will then be required to complete procurement and installation of the charging system.

In June 2003, the *Government Offices* presented a proposal for new fairway charges. This proposal has been circulated for comment and is at present being drafted by the Ministry of Industry, Employment and Communications.

Work is also taking place within the Government Offices on introducing the EC directive to regulate railway infrastructure charges. According to current plans, it is intended to deal with the issue of charges as part of new integrated railway legislation.

Marginal costs and degrees of internalisation

The *National Road Administration* has produced new calculations during the year for road traffic's wear and tear costs broken down by road category and type of vehicle. The marginal cost for an average lorry for roads with differing density of traffic varies from SEK 0.21 to 1.20 per vehicle kilometre. The National Road Administration makes the assessment that the ratio between the average and marginal cost of an average road in the regions studied is approximately 4 and largest on minor roads. The new calculations of marginal costs are lower than those reported earlier.

The Civil Aviation Administration has attempted to calculate a marginal cost for accidents based on the costs of air-traffic management (working hours for air-traffic controllers) to maintain the level of security at an increased volume of traffic. Since the adaptation of the air traffic management service also entails navigation assistance and reduced delays, it has not been possible to calculate a separate marginal cost component for accidents.

From 1 January 2004, the Administration is introducing a new LTO-cycle related emission charge with a differentiation that better reflects emission costs than the previous charge.

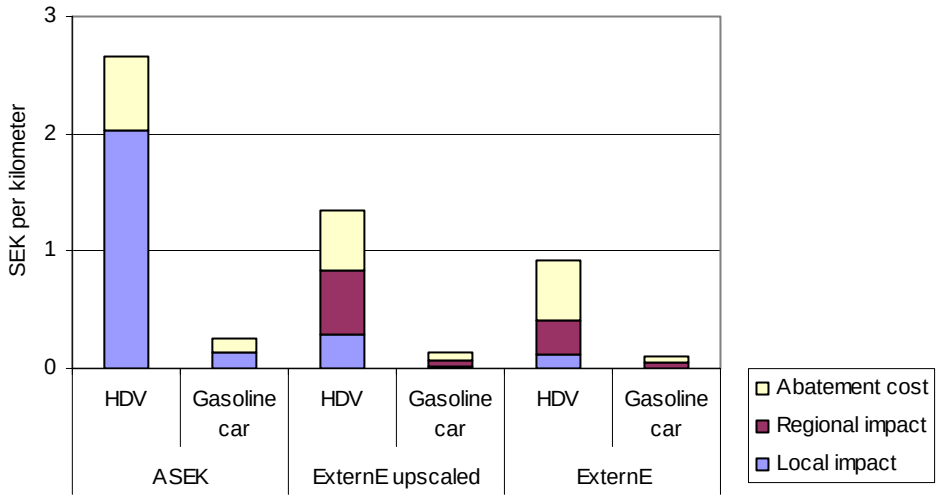
The Civil Aviation Administration has also initiated work to shed light on the prerequisites for developing a distance-related emission charge. A study co-financed with SIDA aimed at calculating the marginal cost of nitrogen oxide emissions en route has been planned to start at the beginning of 2004.

The *National Rail Administration's* development work during the year has been focused on determining the marginal cost for track wear and tear, in particular the reinvestment component. However, no new calculations of track wear and tear have been reported.

The Swedish Maritime Administration has on a number of occasions previously underlined that estimates of the marginal costs of shipping relevant for charges also include the marginal costs for the emissions of shipping to the atmosphere during the time that ships are in port for loading and unloading. The administration has now reported an estimate of the emission cost per hour in port. The Administration has also, on the basis of the Government's mandate to GTD 2002 summarised its view of and made an inventory of the state of knowledge as regards the marginal costs and pricing of port operations.

Work on the ExternE model

Work has continued in 2003 on clarifying the prerequisites for going over to the ExternE model for estimates of the emission costs of Swedish traffic. A study by Nerhagen and Johansson shows major differences in valuation of environment effects by different methods, in particular with regard to local effects. These will be considerably lower with ExternE- than with the ASEK-method, which is normative for Swedish investment planning. As shown in the following diagram, the local costs are about 10 times higher with ASEA estimates. The "higher" ExternE alternative is based on the higher so-called ER coefficient for the long-term effect on mortality of particle emissions that experts have considered as possibly being preferable.



Comparison between ASEK and ExternE, emission costs for traffic in built-up areas. Source: Nerhagen och Johansson (2003)

In ASEK, the regional effects are evaluated indirectly on the basis of political positions. In the ExternE study referred to, they are calculated partly with the chain-of-effect model and partly as the abatement cost (for the acidification effect). The ExternE study also adds on the local impact when the cost is to be calculated for rural areas, which provides an evaluation for rural areas that is higher than in ASEK. The inclusion of the abatement cost when calculating the cost of the regional effect means that ExternE estimates approach the estimates of corresponding effects with the ASEK values.

SIKA has also reviewed current research reports and finds that there are still a number of uncertainties both about Extern E and ASEK. As regards the work of quality assuring ExternE, SIKA draws the following conclusions:

- The higher ER-coefficient for the long-term effect of particles on mortality that ExternE previously recommended and which ASEK uses, should probably be used.

- The quantities of nitrous oxide that occur in Swedish built-up areas probably do not have any major health effects. Nitrous oxide should be regarded as an indicator of car exhausts. It is probable that the effects primarily depend on other exhaust components. The local effects on health should therefore be evaluated through particles and not nitrous oxide in accordance with ExternE.
- The abatement cost should be used to evaluate effects on the ecosystems, since the damage costs of these effects are difficult to calculate. Further inputs are required to improve the quality of the estimates of the costs of measures.
- There are a number of effects that are not evaluated today and which may entail that the evaluations should be higher than they are at present. One example is the health effects of wear and tear particles. It may also be justified to give special consideration to the health effects on children.
- Differences between countries as regards effects for a given exposure should be noted. An EU-study indicates that the effects of certain exposure can be higher for Stockholm than for other European cities. One explanation might be that Sweden has a high proportion of asthmatics.
- The ExternE calculations made to date are difficult to generalise so that development initiatives are need to make use of them for applications in Sweden.

Some work therefore remains to be done before we can recommend definite ExternE-based evaluations. At the same time, we regard it as important that a move to ExternE can take place in the near future because the ExternE-model is becoming increasingly norm-setting internationally and developed evaluations are required for Swedish planning and analytical contributions.

Since it is proposed that the method for issue cost calculations be unchanged until further notice, and since the few new estimates of other marginal cost components that the transport agencies have reported are considered to be uncertain, SIKA has refrained from revising the calculations of marginal costs previously published. A further reason for this cautious approach is that a review should await the results of VTI's marginal cost project in spring 2004.

Updating of the degrees of internalisation

An updating of the degrees of internalisation has been made to take into consideration the relatively small changes in charges/taxes that have been made.

Within *road traffic*, it is only petrol cars with catalysers that now cover their external costs through energy tax, and then only in traffic in rural areas. In traffic in built-up areas, only just under two-thirds of the costs of these cars are covered by energy tax. The degree of internalisation of petrol cars without a catalyser are only half as high.

Diesel cars have the lowest degree of internalisation among cars. In traffic in rural areas, energy tax for these cars covers only approximately a fifth of the external costs. In traffic in built-up areas, the coverage ratio is less than a tenth.

Petrol cars with catalysers make up the largest category of the Swedish car fleet. At the turn of the year 2002/2003, 95 per cent of all cars on the road were petrol-driven. Just under every fifth car now is not equipped with a catalyser.

For heavy vehicles, the degree of internalisation is about the same as for diesel cars, approximately 20 per cent in traffic in rural areas and just under ten per cent in traffic in built-up areas. HGVs weighing between 3.5 and 16 tonnes cover their costs to approximately the same extent as HGVs with a weight over 16 tonnes.

In the case of *rail transport*, there are relatively large differences between charges and taxed marginal costs for all cost components. In some cases, the taxed marginal costs are lower than the corresponding charges for the costs of wear-and-tear and accidents. However, no reinvestment cost is included in the estimate of wear-and-tear costs, since the size of these costs is very uncertain. It has been considered unclear whether the total wear-and-tear cost relevant to charges exceeds or is less than the present track charge.

The situation is the reverse for other cases, for marshalling and emissions excluding carbon dioxide, i.e. the estimate of marginal cost (in the case of marshalling, the average cost) is considerably higher than the corresponding charges. Moreover, there is the cost of carbon dioxide emissions by diesel-powered traffic. SIKA has also pointed out in previous reports that the emission costs arising during the production of the electricity used for the electric train traffic are not fully internalised at the level of production. Furthermore, there is the marginal cost for noise, where relevant estimates are lacking. Altogether, this indicates that the actual marginal costs are higher than current charges.

In the case of *sea transport*, the emission cost is the predominant marginal cost item. The total marginal cost is around SEK 450 million during a year if the emission component is värderas using ExternE. This is to be compared with total charge revenue of SEK 1,130 million per year, i.e. charges are of the magnitude of 2.5 times the marginal costs. If, however, the emission costs are evaluated in accordance with ASEK, the aggregate marginal costs come to a considerably higher level, SEK 1,825 million and charge revenue accounts in this case only for approximately 60 per cent of the marginal cost.

Pilotage charges total SEK 202 million. The marginal cost calculations that have been made have a considerable range and are in the interval of SEK 50 to 400 million. The part of the fairway charge used for icebreaking operations, approximately SEK 30 million, is in the interval calculated for the aggregate marginal costs for ice-breaking (SEK 20–75 million).

In the case of *air transport*, the Civil Aviation Administration has accounted for marginal costs calculated for a flight example between Stockholm/Arlanda and Gothenburg/Landvetter, see following table. This shows that there is especially great uncertainty concerning emission costs en route.

Compilation of estimated marginal cost for the example route Stockholm/Arlanda–Gothenburg/Landvetter. Source: Final report of the government commission in 2003 for the marginal social costs of air transport, Civil Aviation Authority, 2003.

Cost component	*SEK/flight*
Environmental impact except noise*	
Start and landing	147–776
En route	178–4 853
Health effects from flight en route	-
Noise	-
Airport services	
Plane-related	286
Passenger-related	476
Rubber removal	0–24
Air traffic management service (including external congestion and security/accidents)	0–140
Accidents incurred	-
Total	1 086–6 555

The type of aircraft in the calculations is a Boeing 737-600 with 123 seats and an assumed seat occupancy rate of 0.6.
*Emissions except carbon dioxide are evaluated in accordance with the ExternE method. ASEK-values would produce higher emission costs.

The emission costs from starting and landing (the LTO cycle) are dominated by the carbon dioxide cost. This has been calculated on the basis of two different evaluations – SEK 0.022/kg which corresponds to the cost of damage for impact on the environment in accordance with ExternE and SEK 0.6/kg respectively, which corresponds to a marginal abatement cost to achieve the emission target in accordance with the Kyoto protocol. The same interval for the carbon dioxide evaluation has been used to evaluate the emissions en route (it is worth noting that we would obtain considerably higher estimates of the emissions costs with the ASEK values).

The charges for the flight example have been calculated at SEK 12,185, to be compared with the estimated marginal costs in the interval SEK 1,086 to SEK 6,555 (noise and health effects from flight en route are not included). Accordingly, the present infrastructure charges cover considerably more than the estimated total marginal costs.

A comparison between separate charge and marginal cost components shows little agreement. For instance, in the flight example, the emission charge is set at SEK 142, compared with emission costs of SEK 325 to 5,629 kronor. The total charges for airport services (landing, passenger and security charge) amount for the same flight to SEK 8,891 compared with the estimated marginal costs for airport services of SEK 762 to 786.

The variability of the marginal costs of road traffic

The information presented by SIKA in the report on the marginal costs of road traffic specifies the marginal cost of an average car or lorry within the different vehicle categories – average taking into account the age structure of the vehicle fleet and composition of different vehicle models. However, there is a

considerably greater spread in the marginal cost between different vehicles than is shown by summary tables of this kind. For instance, the marginal cost differs between car models made in different years. New vehicles accordingly comply with higher emission requirements, although other characteristics can differ depending on the technological development that has taken place over time.

The following table shows the marginal cost for emissions for some examples of cars compared with the cost of average cars, and the cost of emissions according to the limit values that apply for environmental class 2005, which will be compulsory on 1 January 2006.

Calculation example, comparison of marginal cost for emissions for an average car and some new car models on the market, SEK/fkm. Source: Documentation on emission factors and fuel consumption from the respective car maker, or Vehicle Certification Agency's database, www.vcacarfueldata.org.uk or Gröna bilister, www.gronabilister.com.

	Marginal cost, emissions,SEK/fkm					
	Rural area			*Built-up area*		
	Emiss. excl. CO_2	*CO_2 (0.91 kr/kg)*	*Total*	*Emiss. excl. CO_2*	*CO_2 (0.91 SEK/kg)*	*Total*
Petrol*						
Average car, car fleet 2000	0.023	0.164	0.187	0.078	0.246	0.324
*MK2005 limit values***	0.005			0.016		
*Opel Corsa, ECO, MK2005****	0.002	0.092	0.094	0.008	0.138	0.146
*Golf Variant 1.6 FSI, MK2005*****	0.002	0.122	0.123	0.007	0.183	0.190
*Volvo V70, MK2005******	0.001	0.172	0.173	0.003	0.259	0.261
Diesel						
Average car, car fleet 2000	0.017	0.137	0.153	0.231	0.191	0.422
*MK2005 limit values***	0.010			0.109		
*Audi A2 1.2 TDI, MK2005****	0.010	0.065	0.075	0.093	0.091	0.184
*Toyota Avensis 2.0 D4D, MK 2005*****	0.008	0.118	0.126	0.090	0.179	0.270
*Volvo V70, MK2000******	0.017	0.142	0.159	0.155	0.199	0.354

*Particle emission for petrol cars in built-up areas is excluded since information to calculate for new cars is lacking.
**Limit value for carbon dioxide not available.
***Best petrol/diesel small car 2003 according to Gröna Bilisters *Miljöbästa bilar 2003*.
****Best petrol/diesel car in large medium class 2003 enligt Gröna Bilisters *Miljöbästa bilar 2003*.
*****Tops the sales statistics for 2003 for petrol cars, no information available on the sales list of diesel cars.

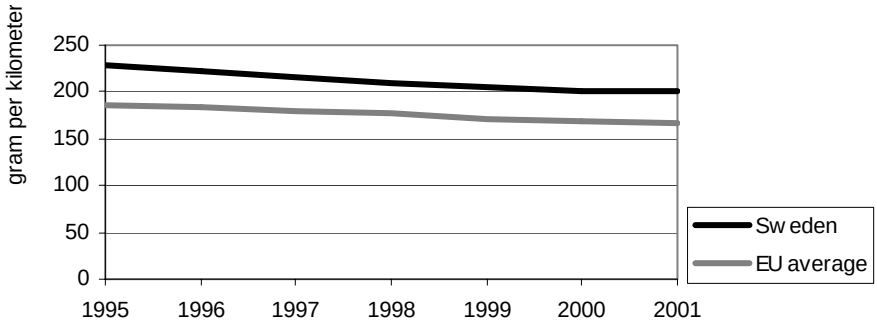
Petrol cars that comply with emissions in accordance with environmental class 2005 have a considerably lower emission cost, approximately 80 per cent both in traffic in built-up and rural areas, than an average petrol car in the current car fleet. Diesel cars that comply with environment class 2005 requirements thus have lower emission costs than the average diesel car, in the range of 40-50 per cent lower depending on whether traffic takes place in rural or built-up areas. In both cases, this applies to emissions excluding emissions of carbon dioxide.

In particular, all new small cars, although also new petrol cars in the medium class have considerably lower carbon dioxide emissions than the average car in the current car fleet. This is due to their lower fuel consumption. The aggregate cost for emissions including carbon dioxide for traffic in rural and built-up areas, is only half as great for petrol and diesel small cars in the calculation example than for the respective average car.

The above relationship does not apply, however, for the new cars that are purchased by Swedes to the greatest extent. The car that tops the sales statistics for 2003 is the Volvo V/C70 followed by Saab 9-5 and Saab 9-3. These are larger cars with a higher fuel consumption and higher carbon dioxide emissions. A new petrol-driven Volvo V70 releases considerably more carbon dioxide than new small and medium-sized cars, but also rather more carbon dioxide than an average petrol car in the vehicle fleet. A new diesel Volvo V70 releases approximately as much carbon dioxide as the average diesel car.

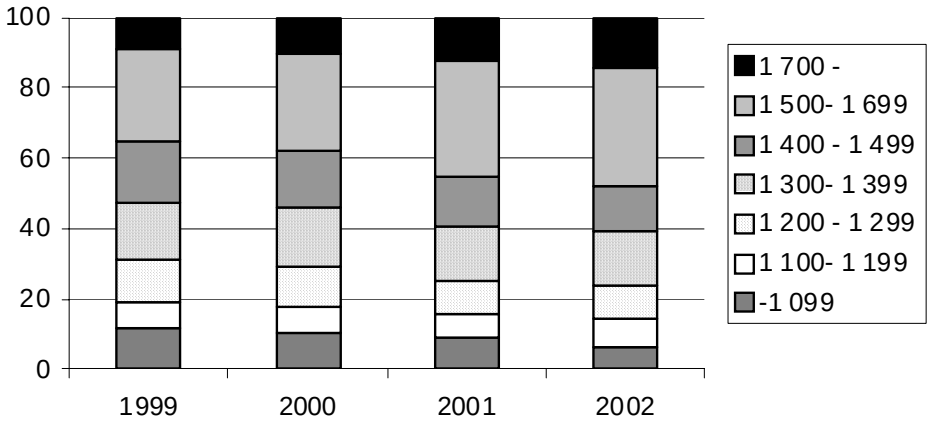
The degree of internalisation is lower for the small and medium-sized cars compared with the average petrol and diesel cars. The reason for this is that the fuel consumption of the smaller cars is lower and the cost per litre fuel therefore higher for these cars.

At the level of the EU as a whole and all carmakers, the average emissions of carbon dioxide for new cars have decreased by approximately 1.9 per cent per year, which is in step with the ACEA-agreement. However, even though development has to date complied with the agreement at EU level, the picture is not as positive for Sweden. While there has been a reduction of the average carbon dioxide emissions of the Swedish new car market between 1995 and 2001, the rate of reduction in Sweden has stagnated compared with Europe as a whole. Development in Sweden has even reversed to a marginal increase between 2000 and 2001.



Development of specific carbon dioxide emissions of new cars, average for Sweden compared with average for EU. Source: Swedish Environmental Protection Agency, *Effektivare användning av energi och transporter*, Report 5315, April 2003.

Emissions in Sweden were at a considerably higher level than the EU average back in 1995, 221 g/km compared with 185 g/km which is just under 19 per cent higher, and this gap has not decreased. Sweden is not only over the average but has the highest use of fuel for newly-registered cars, both for diesel and petrol cars. This is related to Sweden having a high and increasing share of larger, heavy cars with powerful engines.



Newly-registered cars 1999–2002 by gross vehicle weight in kg. Source: Figures from SIKA/Statistics Sweden processed by Bil Sweden, *Bilismen i Sverige 2003*.

Besides the increase in heavy cars in the Swedish market, the proportion of light lorries is increasing in the lorry fleet. These are vehicles that have the same area of use as a car in many cases. Between 1999 and 2003, the number of lorries with a total weight of at most 2 000 kg increased by 70 per cent and the proportion of all lorries in traffic in Sweden in this weight class from 18 to 25 per cent.

Technical development has also led to an improvement in the collision safety of new cars. In the first place the protection concerns people in the car and it can therefore be said that this is equipment that the owner was able to take into consideration and assess the value of when purchasing the car. Certain types of car equipment such as ESP-systems, can, however, lead to the marginal cost relevant to charges being lower for these cars. This variability in the accident marginal costs between vehicles should therefore in principle be taken into account on internalisation.

The marginal costs for exhaust emissions by lorries vary considerably between vehicles in different environmental classes. The difference between a lorry of environmental standard EURO 0 and EURO III, which is operated in rural areas, is over SEK 0.40 per kilometre and even higher for built-up areas, almost SEK 0.60 per kilometre.

While the differences in marginal cost in lorry driving in different built environments is considerable (the cost of driving in a less densely populated built-up area is more than double and the cost of driving in a built-up areas four times higher than driving in rural areas), the differences in the average marginal cost of different typical goods transport relations is considerably less. The reason is that the proportion of rural lorry driving for long-distance lorry transport in Sweden is typically high.

Lorry traffic in Sweden would not be affected by any major increases in costs if a (planned) uniform kilometre-tax (km-tax) based on the marginal cost calculated for rural conditions, was replaced by a km-tax which was spatially differentiated to include the additional marginal costs incurred when the vehicle was driven in various built-up environments. However, this would not mean that the

internalisation of the built-up marginal costs was unimportant from the point of view of control. The considerable differences in marginal cost calculated for different built environments would, if they were expressed by differentiated kilometre-taxation, provide strong incentives for vehicle owners to choose alternative routes to reduce the number of kilometres driven in built-up areas. The significance of this could be established retrospectively after an in-depth analysis showing the extent to which there are alternative routes that would provide the vehicle owners with lower marginal costs (and km tax).

Effects of changed infrastructure charges

In this report, SIKA also presents the effects that arise if kilometre-taxation based on the Swedish marginal cost, the planned German km-tax level, are introduced in the rest of Europe (EU15 and EU25 respectively). The effects of moving over to a marginal-cost based pricing system on goods transport by road have been calculated with the aid of the Samgods model. The analyses relate to the distribution of a given transport performance between and within different categories of transport. In SIKA Report 2003, the effects are calculated of a case where Sweden alone is assumed to move over to a marginal-based km-tax.

Lorry transport in Sweden is not estimated to be significantly affected by an extension of the kilometre tax system. It is not either possible to discern any distinct corridors in Sweden that are affected more either by a Sweden-based or a Germany-based kilometre tax in Europe, compared with the case of kilometre tax being introduced in Sweden alone. Shifts take place to both the railway and sea transport.

Lorry transport reduces relatively much if a Germany-based kilometre-tax system is introduced and, then in particular, lorry transport through Germany. All transfer in Europe is expected to take place to the railway. Lorry transport in Europe can be expected to find new routes through countries that have not imposed a kilometre tax. According to the calculations, it is in particular the corridor through Germany (from Rostock via Berlin and Munich down to southern Europe), which is affected. However, it has also been estimated that lorry transport from the port of Rotterdam to France would decrease considerably.

In Sweden *railway traffic* is expected to increase by a few per cent of an expanded (Sweden-based) kilometre tax system. On the continent, it is estimated that the transfers to the railway will be greater. They will increase greatly if a Germany-based charging system is introduced in the EU25 area.

For *sea transport*, an expansion of the Swedish-based charging system will mean that a reduction of its proportion of transport performance in Sweden. The changes are only estimated to be small on the continent.

The calculations indicate that the areas of competition between the categories of transport appear differently in Sweden and on the continent. In Sweden, this primarily concerns movements between rail and sea transport, while on the continent, it almost exclusively concerns transfers from lorry to rail transport. One

explanation of this is that feeder traffic (by lorry) is generally shorter for rail than for sea transport.

We have also attempted to clarify the effects of kilometre-tax differentiated in accordance with the environmental characteristics of lorries. These calculations show that the additional cost of replacing the exhaust cleaning of Euro II lorries by newer with a good margin is compensated for by a reduction in the total charges imposed.

If the composition of the Swedish lorry fleet was to be changed so that all Euro 0, Euro I and Euro II lorries were taken out of use and replaced only be vehicles of the best available environmental standard, Euro III, the emission marginal cost is calculated to decrease by SEK 0.14 per vehicle kilometre. If they are replaced by the prospective environmental standards Euro IV or Euro V, the reduction is estimated to be as great as SEK 0.25 or SEK 0.37 per vehicle kilometre.

The total tax revenue to the state from Swedish HGV traffic (over 16 tonnes maximum load weight) is expected to increase regardless of which tax-related taxes and charges the kilometre tax replaces.

Pricing for socially efficient goods transport

The Goods Transport Delegation, GDT 2002, has been given the task of reviewing the prerequisites for socially efficient goods transport. In this report, SIKA wishes to make a contribution to pricing analysis and considers that there are no reasons of principle, when looking for an efficient financing solution, to categorise the transport sector (or parts of it) as a unit for analysis. The size of the contribution of the transport sector should be determined in a total, cross-sector assessment, which could produce the result that the sector is to contribute with more or less than the costs that arise in the sector.

A quantified cost coverage requirement for the transport sector should not be broken down by category of transport. The distortion cost can be minimised only if the charging of financed taxation is permitted to differ for different categories of transport.

The question of neutrality in competition must, in the light of the currently applicable transport policy decision, in the first place concern creating neutrality by a more consistent application of the marginal cost principle. A uniform assessment of transport categories as regards total responsibility for costs cannot be justified.

Tax charges over the level of marginal costs primarily come into question for the consumer-related passenger transport and not for good transport which is to be considered as an input good in the production system.

Distortions of passenger transport can be limited by, wholly or partly, imposing financed charges as fixed charges within the framework of charge systems with multiple divisions (possibly, only two divisions).

Terminals used for lorry traffic are normally an integrated part of a commercial activity. There is nothing either to indicate that the cost structure is such as to justify anything other than commercial pricing of terminal services. The same should also apply to ports and railway terminals that are wholly or mainly associated with the needs of particular industry or business. However, the conclusion is less clear with regard to larger combi-terminals for reloading between road and rail transport, larger ports that serve as important reloading points between road and sea transport (and, in principle, all public airports that are, however, less important in a freight transport perspective). All of these cases concern facilities of which there can only be a limited number and which thus serve as geographical monopolies to serve and be shared by many different users. The investments made in this type of facilities have largely no alternative use and it is not excluded that the cost structure is at least partly such that the business is characterised by falling diminishing unit costs. At least for ports (and airports), it is also the case that the external effects of the activity can be considerable.

The Commission's proposals on a revised Euro vignette directive

In July 2003, the EU Commission presented its proposal on amendment of the current road charge directive, known as the Euro vignette directive. The Commission's proposal has been assessed by Per Kågeson, whom SIKA has appointed to evaluate the proposal, to be able to produce considerable benefits in relation to the current directive through the broader area of application. This assumes a kilometre-taxation on the national motorway networks and makes it possible for the countries to expand the application to the national road network in its entirety. It consists of a broader group of heavy vehicles (down to 3.5 tonnes) and is based on more relevant cost components for pricing. The proposed directive allows the charges to vary with respect to the route, the place, the time of day and the type of vehicle.

However, Kågeson also sees considerable problems. He considers that grounds are lacking for the introduction of level thresholds for different charge components, since the costs vary a lot due to local and national circumstances. He notes in particular that the proposal can prevent charging that fully reflects the marginal costs of air pollution and congestion. The proposal means that the highest congestion charge will be twice as high as the lowest, which is considered to be insufficient to reflect the threshold cost differences in the more heavily trafficked parts of Europe.

Kågeson finds the geographical charge level differentiation permitted by the proposal insufficient. He considers it to be good that a geographical differentiation is permitted for the wear and tear component, since this component varies considerably according to road substructure, but he also argues that it should be possible to express differences in accident costs for roads of different qualities. He would also like it to be possible to differentiate the air pollution component between rural and built-up areas.

Kågeson also considers that the proposal prescribes to a great an extent what countries are to do. The proposal does give sufficient consideration to the principle of subsidiarity. It is especially emphasised that the directive should not prescribe how Member States should finance investments in new infrastructure. According to Kågesson, there are no reasons to stipulate that countries should use tolls (km-taxes) to cover the fixed costs of the transport system. And there are no reasons to earmark toll/km tax revenue for investments in the transport infrastructure.

The directive proposal provides an upper limit, a ceiling, for the average level of charges that a country may impose in toll /km-tax. A summary calculation indicates that the estimated marginal costs of lorry traffic will be less than the charge ceiling by a broad margin. We conclude from this that the charge ceiling will not be binding for pricing of lorry traffic in Sweden.

As Nash underlines in a comment to Kågeson, the charge ceiling can have the function of preventing overcharging of toll/km-tax that individual countries, in particular countries with a large proportion of transit traffic, can be motivated to impose. The ceiling would then be to Sweden's benefit, provided that it contributes to keeping the infrastructure charges that are imposed on Swedish goods transport abroad closer to the level of marginal cost.

ECMT draws attention in an evaluation of the proposed directive that it is also important to take international distribution effects into account. What is required is an internationally harmonised annual vehicle tax, so that vehicle owners in different countries have to pay the same tax, and a mechanism which makes it possible to redistribute income between countries in relation to the costs of traffic. In the absence of such a solution, there may be reason to use variable taxes, such as the km-tax, to obtain a contribution from foreign-registered vehicles to cover the fixed costs of one's own road network as well.

The force of the argument for applying coverage of fixed costs in a variable charge depends, however, on how large a proportion of the traffic is foreign. If the major part of the traffic is domestic, the argument for deviating from solely marginal cost-based charges is weaker. This should mean that Sweden does not have any reason to set its charges significantly over the level of marginal costs, and that it would benefit from other countries not being given scope for or making use of the possibility of "overcharging".

Conditions of competition on differing goods transport markets

In this report, SIKA also sheds light on conditions of competition in different freight transport markets. Marginal-cost based infrastructure charges are not sufficient to guarantee a socially efficient use of the transport system. This would also require transport providers to adapt their pricing in relation to purchasers of transport to their (commercial) costs. To be efficient in a more long-term perspective, it is also required that traffic transport providers and vehicle manufacturers have an incentive to increase productivity through technical and organisational innovations (dynamic efficiency). The prerequisite for pricing

adapted to costs and for a sufficient incentive to innovate are assumed to be that the transport providers carry out their activities in a competitive environment.

Deregulation has taken place in Sweden in several stages in a various parts of the transport sphere since the mid-1960s. One reason for this deregulation has been that it has not been considered possible to steer an industry towards high efficiency, low prices and satisfactory customer service by administrative measures. To achieve this, an attempt is made to create functioning market mechanisms with a combination of deregulations and other competition policy measures.

The conditions of competition on the goods transport market are improved with implemented or planned national or international liberalisations and harmonisations. However, it is not certain that the actual market competition will be sufficient. The freight transport market is highly compartmentalised and the prerequisites for efficient competition in different market segments and at different levels vary greatly. In the case of lorry transport, there is, for instance, a low concentration at the level of the operators and a high concentration at the intermediary level, while the railway market is dominated by a single large operator. The Swedish Competition Authority has for some time given priority to studies of railway and aviation, although this does not mean that the state of competition in various road and sea transport markets is satisfactory.

Substitution competition from other categories of transport can seem to have a restraining effect on transport prices, at least in certain market segments. Lorry transport is considered to be price-leading for lorry, combi and rail transport in the market for land-based transport. The Institute for Transport Economics in Oslo (TØI) has also found that prices for lorry transport are significantly lower where there is a railway alternative, which illustrates that the two categories of road transport compete with one another to some extent.

THE SWEDISH INSTITUTE FOR

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The Swedish Institute for Transport and Communications Analysis, SIKA, is an agency that is responsible to the Ministry of Industry, Employment and Communications. SIKA was established in 1995 and has three main areas of responsibility in the transport and communications sector:

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- To develop forecasts and planning methods
- To be the responsible authority for official statistics

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ISSN 1401-3460