



Designs for Interurban Road pricing schemes in Europe

Case Study Switzerland:

Heavy Vehicle Fee LSVA

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Case Study Switzerland Heavy Vehicle Fee LSV

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Abstract

DESIRE (Designs for Interurban road pricing Schemes in Europe) is a project of the 5th Research & Development Framework Programme of the European Commission, DG VII TREN (Energy and Transport), Program „Competitive and Sustainable Growth“.

Workpackage 3 includes specific Case Studies (CS) in 10 countries. These specific CS will provide detailed information and experience on the feasibility of different types of IRPS in different national and local contexts. The specific CS will focus on specific elements of IRPS and/or will analyse alternative IRPS and compare them to present or planned systems.

On 1st January 2001 the Swiss distance-related Heavy Vehicle Fee LSVA replaced the existing flat-rate heavy traffic fee and covers all heavy vehicles over 3.5 tonnes carrying either goods or passengers.

The LSVA is levied according to the following main criteria:

- the number of kilometres covered on all public roads in Switzerland;
- the maximum permissible laden weight;
- the emission category of the heavy goods vehicle.

Being the first nation-wide implementation of a kilometre charging electronic fee collection system, the distance-related LSVA marks a major progress towards fair and efficient road pricing.

The Swiss Case Study of DESIRE project offered the unique opportunity to elaborate a case study covering all phases (pre-analyse, concept phase and implementation) of this interesting project.

Therefore the Swiss case study covers the political process, the legal framework and the technical approach as well as the expected and observed economic and social impacts. Special attention is given to the first practical experiences and effects of the LSVA of the new collection system.

Keywords-

DESIRE – Heavy Vehicle Fee – LSVA – Interoperability – Transport policy – Electronic Fee Collection – Road pricing – Heavy Goods Vehicles (HGV) – DSRC – 2nd Swiss Transport Research Conference – STRC 2002 – Monte Verità

1. DESIRE

1.1 Background

DESIRE is a project of the 5th Research & Development Framework Programme of the European Commission, DG VII TREN (Energy and Transport), Program „Competitive and Sustainable Growth“.

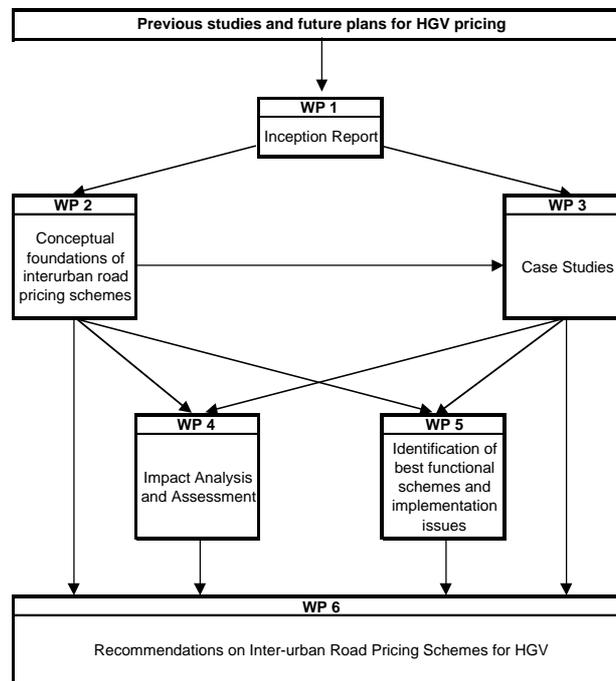
The project started in September 2000 and will last 30 months. Under the lead of TIS.pt, Consultadores em Transportes, a reputed and independent consultancy in Portugal a total of 17 partners from 10 European countries are involved in DESIRE. The Swiss partners in DESIRE are ECOPLAN Economic and Environmental Studies, Bern and RAPP AG Engineers and Planners, Basel.

The aim of the DESIRE project is to assess, through the development of realistic case studies, inter-urban road pricing in Europe. The research seeks to deliver a set of best designs for future inter-urban road pricing schemes (IRPS) for heavy-vehicles as well as an in-depth analysis of the different aspects determining the success of the implementation of these schemes.

1.2 Structure of DESIRE

To achieve the objectives the work is organised into the following inter-linked WP (workpackages):

- **WP1 – Production of Inception Report**, where the consolidation of the findings of previous research projects will be done together with a survey of the state of affairs on this issue in the various countries and a careful design of the work to be carried out in the Case Studies. The discussion of this inception report may lead to a partial redefinition of the work to be done in WP3 (Case Studies);
- **WP2 – Conceptual foundation of inter-urban road-pricing schemes**, where a sound theoretical foundation of possible designs for inter-urban pricing schemes (IRPS) for heavy vehicles will be provided;
- **WP3 – Case studies**, where a set of case studies selected on the basis of their perceived additional value for the project (as shown in WP1), covering a wide diversity of EU countries (plus Switzerland, Hungary and Brazil), will be put to test (specified schemes of IRPS);
- **WP4 - Impact analysis and assessment of IRPS schemes**, where the IRPS schemes developed and tested in the previous WP will be assessed against a consistent framework;
- **WP5 – Identification of best functional schemes and implementation issues**, dedicated to a clear selection of the best key elements within each IRPS scheme, as well as to the best design guidelines and principles, in terms of potential for successful implementation, that follow from the previous WP's;
- **WP6 – Conclusion and recommendations**, where the synthesis of the overall project will be done providing clear guidelines on the pros and cons of each IRPS scheme.

Figure 1: Work package structure of DESIRE

WP 1 (Inception Report) and WP 2 (Conceptual foundation of inter-urban road pricing Schemas) have already been completed. WP 3 will be finalised by end of March 2002.

1.3 Case Studies

Workpackage 3 includes specific Case Studies (CS) in 10 countries. These specific CS will provide detailed information and experience on the feasibility of different types of IRPS in different national and local contexts. The specific CS will focus on specific elements of IRPS and/or will analyse alternative IRPS and compare them to present or planned systems.

In addition to these specific CS, each country will undertake detailed analyses of the national background of the case study - in the following referred to as the National Context.

The National Context will present the general background and framework for the specific CS in the country and will describe and assess:

- the present state of affairs in the country
- likely developments over the coming 5-10 years
- issues related to alternative technical systems
- issues related to alternative institutional and financial arrangements
- particular issues of interoperability

Task 3.2 of WP 3 covers the Swiss Heavy Vehicle Fee LSVA. The elaboration of the this Case Study started in August and lasted until Febraur 2002. The Swiss case Study was elaborated by the two Swiss partners of the DESIRE project consortium. ECOPLAN will mainly cover the economical and institutional part, RAPP the technical and conceptional part of the Swiss Case Study.

2. BACKGROUND OF SWISS CASE STUDY

2.1 Objectives and main pillars of the Swiss transport policy today

The actual Swiss transport policy can be summarised as follows:

- **Harmonisation with Europe:** Realise the bilateral agreements (including the Land Transport Agreement) between the EU and Switzerland, improve connections with Trans-European network, harmonise the standards. With the **Land Transport Agreement**, the EU member states recognize Switzerland's aim of shifting goods from road to rail and the related instruments, in particular the distance-related Heavy Vehicle Fee LSVA.
- **Greater emphasis on cost allocation and fair charging:** Introduction of the distance related heavy vehicle fee LSVA. In September 1998, the people voted in favour of the introduction of a distance-related Heavy Vehicle Fee (LSVA). This implements the polluter pays principle and ensures that road haulage reflects the true costs.
- **Modern rail infrastructure:** In November 1998, the people and Cantons approved the modernization of the railway infrastructure. With investments of around 30 billion francs, the first and second stages of „Bahn 2000“ (Rail 2000), the NEAT-Network with two new base tunnels through the Gotthard and the Lötschberg, the connection of east and west Switzerland to the European high speed rail network and the noise reduction measures on Swiss railways will be completed over the next 20 years.
- **Efficient rail service:** Implement fully the railway reform and prepare additional steps towards more rail competition. Use optimally the existing railway capacity. In March 1998, parliament passed the railway reform. It entered into force on 1st January 1999 and brings competition into the Swiss railway system. The railways now have the necessary flexibility and entrepreneurial freedom to enable them to compete with road transport in the future transport market.
- **Protecting the Alps:** Provide attractive rail services, especially for transalpine goods transport and therefore support unaccompanied combined transport and the Rolling Highway.
- **Maintaining a high-performance road system:** Completion of the motorway network and increase maintenance, propose solutions to avoid congestion on saturated motorway sections. The Federal Roads Office develops therefore a national road transport and traffic telematics strategy.
- **Solve traffic problems in urban areas:** The actual financing of (public) urban transport is questioned. Agglomerations ask for a stronger involvement of the Federal level. New infrastructure may be necessary to avoid congestion but possibly in combination with new financing mechanisms (urban road pricing).
- **Qualitative progress in air transport:** Liberalise market access and support a sustainable aviation infrastructure (including the 5th stage of extension of Zurich airport).
- **More stringent use of resources:** Continue the programme Energy 2000, introduce stricter exhaust requirements, co-ordinate better with land use planning.

2.2 Present state of affairs

On January 1st, 2001 the distance-related Swiss Heavy Vehicle Fee LSVA replaced the existing flat-rate heavy traffic tax and covers all heavy vehicles over 3.5 tonnes carrying either goods or passengers.

Being the first nation-wide implementation of a kilometre charging Electronic Fee Collection (EFC) system, the LSVA marks a major step towards fair and efficient road pricing.

The collection system for the Swiss LSVA has successfully started operation. Overall, the timely start proceeded without major technical or organisational problems.

2.3 Taxation and financing of roads

The Confederation makes considerable financial contributions to the road network: these are mainly towards investments in the construction and maintenance of the national roads and the construction of main roads. It also contributes to the operation of the national road network. The remaining road network costs are borne by the cantons and the municipalities. The Confederation is financing around 87% of the total cost of the motorway network, the remaining cost are financed by the Cantons.

Revenue and expenditure for construction and maintenance of the road network are summarised in the Highways Account, which is published annually. In 2000, 3.387 billion CHF were spent on the Swiss road network. The revenue required comes principally from contributions made by road users.

The funds for the construction, maintenance and operation of the national roads derive from earmarked special financing fed from the following sources:

- Half of the gross revenue from fuel taxes;
- The entire surtax charged on fuels;
- The former flat-rate heavy vehicle tax;
- Revenue from motorway tolls for private cars (vignette).

3. DETAILS of LSVA SYSTEM

In the following table the essentials of the collection system for the LSVA are summarised:

Objectives of systems	<ul style="list-style-type: none"> – Demand Management – Reduce Alpine Transit Traffic – Achieve a Modal Shift from Road to Rail
Pricing scheme	Area Tolling
Subject of the fee	The LSVA applies to all domestic and foreign heavy vehicles and trailers for goods or passenger transport with a maximum laden weight in excess of 3.5t.
Basis for assessment	<p>The LSVA will be levied according to the following main criteria:</p> <ul style="list-style-type: none"> – the number of kilometres covered on all public roads in Switzerland – the maximum permissible laden weight – the emission category of the heavy goods vehicle <p>The tariff depends on the emission values of the vehicle.</p>
Liable person	The registered owner of a vehicle - with foreign vehicles additionally the driver - is liable to the tax. The responsibility for the declaration and for the proper function of the equipment is with the liable person.
Recording of the fee base	<p>The fee collection is based on the principle of self-declaration.</p> <p>The liable person is obliged to actively participate.</p> <p>For domestic vehicles the installation of an on-board unit is mandatory. Foreign vehicles can optionally be equipped with an OBU.</p> <p>Foreign vehicles basically are using a ticket fetched at self-service machines.</p>
Tariff	<p>For the years 2001 – 2004 the following values are applicable:</p> <ul style="list-style-type: none"> – Fee category 1: (Emission class Euro 0) 2.0 cts. per tonne-kilometre – Fee category 2: (Emission class Euro I) 1.68 cts. per tonne-kilometre – Fee category 3: (Emission classes Euro II and III) 1.42 cts. per tonne-kilometre <p>For 2005 the Federal council will set new rates, taking technical developments into account. The maximum rate is fixed by 2.75 cts. per tonne-kilometre.</p>
Special regulations	<p>For the following vehicles and types of transport there are special regulations:</p> <ul style="list-style-type: none"> – Travel in unaccompanied combined traffic, road/rail or road/ship (Unbegleiteter kombinierter Verkehr; UKV) – Transport of logs/raw wood – Transport of unpacked milk and livestock from agriculture
Exceptions	<p>Coaches, motor homes, and industrial or communal tractors and service vehicles pay a flat fee (no distance relationship).</p> <p>Agricultural and public transport vehicles, ambulances and vehicles of the armed forces, of the police, etc. are completely exempt from the LSVA.</p> <p>The LSVA ordinances foresee further flat-rate exceptions and total exemptions.</p>

Political process and acceptance of the Swiss LSVA

The LSVA cleared its final political hurdle in September 1998 with a surprisingly large mandate: 57% of Swiss citizens voted for the new fee. This was the successful completion of a 20-year marathon.

The success of the LSVA is due to an extraordinary situation, a unique window of political opportunity, where environmental considerations (avoid lorry transit) were combined with transport and regional considerations (assure the finance for NRLA) and economical and political arguments (avoid opposition against the agreements Switzerland/EU). Last but not least, the success is also due to the fact that HGV taxation and the problem of the external costs of transport have been on the agenda for a long time and people got familiar with it.

Institutional solution

The Swiss Customs Administration (Eidgenössische Oberzolldirektion, OZD) was in charge of the implementation of the LSVA and operates now the system as well.

The levy of the LSVA is embedded in the normal customs procedures at the border. Intensive training of the personal and instruction material was necessary for a smoothly implementation of this new task.

Expenses and revenues

Costs of system

The whole planing, development and procurement of equipment and implementation of the LSVA system occurred about 192 Mio. EURO. In this amount 87 Mio EURO for the procurement of the rather costly OBU (about 800 EURO per unit) is included.

The OBU is distributed free of charge to domestic and foreign vehicle owners until 2004. The installation costs of up to about 300 EURO have to be carried by the vehicle owner.

Expected costs of operation and maintenance

The yearly operational costs will be about 16 Mio. €.

In addition, the depreciation of the investments over a period of 7 years amounts to about 12.5 Mio. EURO of yearly amortisation costs.

Expected revenues

Assumed revenues until 2004 when the tariff level can be lifted the first time amounts to 500 – 600 Mio EURO per year.

From 2008 when the highest fee level (2.75 cts / tkm in average) can be charged the assumed revenues will be up to 1000 Mio EURO per year.

Interoperability

Interoperability with other / future EFC systems in Europe was an important prerequisite for the Swiss LSVA system from the outset.

Switzerland therefore pressed actively for the technical implementation of the charging standards to be harmonised: both in the EU coordinatory organ for fee collection in road traffic, CARDME (Concerted Action for Research on Demand management in Europe), and in the European Standardisation Organisation, CEN (Comité européen de normalisation).

The Swiss system is in accordance with the CEN DSRC 5.8 GHz pre-standards. This has created the basis for an option of one-sided interoperability. Basically, the Swiss OBU TRIPON can be used abroad for all systems in accordance with the CEN DSRC 5.8 GHz standards. Contractual agreements and procedural harmonisation are a prerequisite, as is a software update on the TRIPON to accommodate the specific requirements of the foreign fee collection system. On the other hand, foreign devices cannot be used for the LSVA, because some extra functionality is required to allow recording throughout Switzerland (e.g. an electrical interface to the vehicle Tachograph for the registration of the kilometres driven).

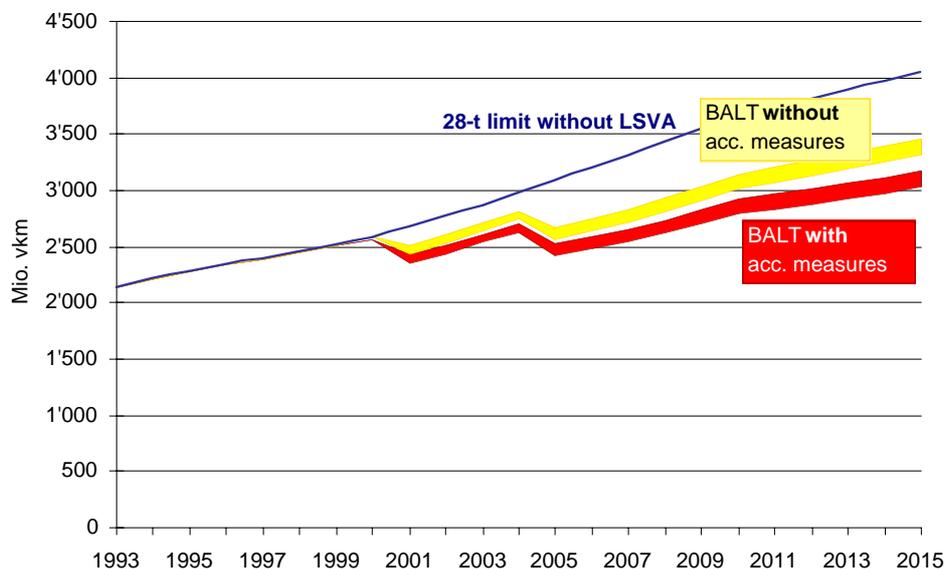
4. EFFECTS OF THE LSVVA

4.1 Expected effects

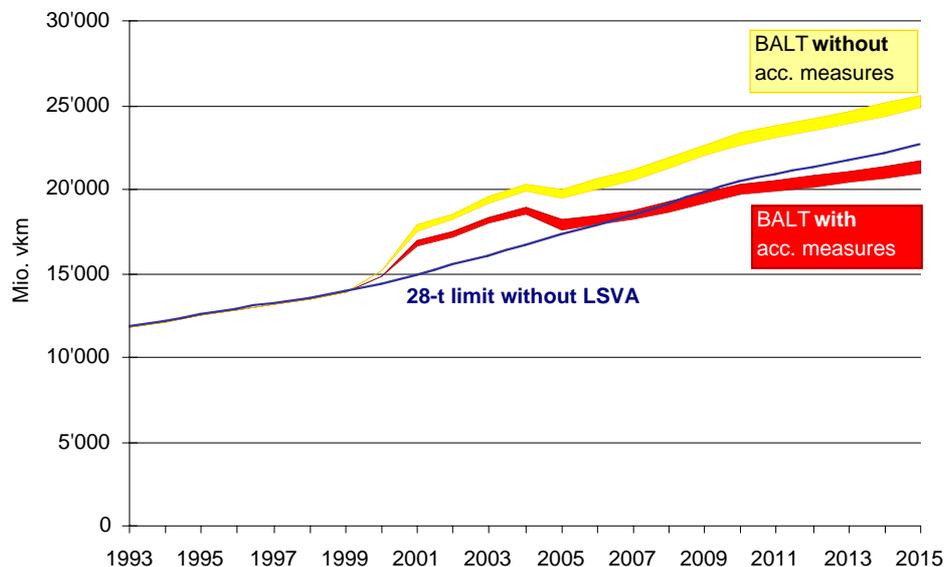
4.1.1 Expected effects on traffic and transport volumes

Figure 2 gives an overview of the estimated effects of the different scenarios on total traffic volume of road freight transport in Switzerland. In the reference scenario a steady growth leads almost to a duplication of traffic volume in the period from 1993 until 2015. Compared to the 'old' transport policy, the BALT-regime brings about a growth stop between 2000 and 2005 and a considerably slower growth in traffic volumes (vkm) in Switzerland until 2015. This environmentally desirable development is independent of the introduction or the success of the accompanying measures in the rail sector. Certainly, traffic volume decreases even more if the measures taken lead to the full expected effect of transferring freight from road to rail. However, in order to protect the Alps from ever growing freight traffic on the Alpine corridors, the success of the accompanying measures are highly important.

Figure 2: Total traffic volume of road freight transport (domestic, import/export and transit traffic; Mio. vkm)



The transport volume (tkm) under the BALT-regime temporarily increases compared to the reference scenario. After 2005, however, the transport volume in Switzerland is expected to be roughly the same as in the reference scenario under the assumption of successful accompanying measures. This development reflects the productivity effect made possible by the rise of the weight limit.

Figure 3: Total transport volume of road freight transport (domestic, import/export and transit traffic; Mio. tkm)

4.1.2 Expected impacts of the LSVA on the transport sector

Adaptations in the road freight transport sector

- The introduction of the LSVA will increase the pressure to rise the payload. In particular empty trips become very expensive. This pressure will strengthen the existing concentration process within the road freight transport sector. Only large companies with 100 lorries or more and with broad internal logistic services are able to produce with a sufficiently high use to capacity of their fleet. As a consequence, the structure of the road freight transport sector will dramatically change: Small haulier companies will disappear to a large part from the market, logistic services are getting more important, and the productivity of the freight transport sector will increase.
- A second effect concerns the structure of the vehicle fleet: The LSVA sets a strong incentive to use “clean” vehicles and thus to renew the fleet. The differentiation of the fee between EURO-classes is sufficiently high to make it profitable in many cases to replace older HGV with new HGV fulfilling the EURO II / III norms. This tendency is strengthened by the adaptation of the weight limit which will rise step by step from 28t to 40t. Additionally, it can be expected that hauliers will optimise the composition of their fleet with respect to the total permitted weight of their HGV.

International competitiveness

- Basically, the LSVA will not affect in a noticeable way the international competitiveness of Swiss hauliers: Domestic as well as foreign HGV have to pay exactly the same fee per kilometre driven. This has been predicted for domestic as well as import/export or transit trips.
- Similarly, the LSVA will not affect the choice of location of the haulier companies within CH.
- If other countries in Europe will introduce a distance related pricing scheme for HGV in the future, there may even be a “first-mover advantage” for Swiss hauliers who had to adapt to this new type of charge earlier on.

Effects on employment

It is expected that the combined introduction of the LSVa together with a higher national weight limit will reduce employment in the freight transport sector compared to a reference scenario. The main reason is the stepwise increase of the weight limit from 28t to 40t. It has been estimated that in 2010 employment in the hauliers sector will be several 10'000 jobs less compared to the reference scenario (28t limit, night and Sunday ban on driving, former flat HGV tax). But because of the expected general growth in this sector employment will still slightly increase in absolute terms. This loss of jobs is the other side of the expected productivity effect caused by the LSVa and especially by the higher weight limit.

4.2 Observed effects during introduction

4.2.1 Procurement process / plan

The procurement processes and tender offers were compliant with WTO-regulations.

All system components, i.e. the on-board units, the DSRC-beacons, background-system, and the enforcement stations have been procured separately. This is a remarkable strategy, since it required a very detailed specification of the one common interface shared by all of these components, namely the CEN/ISO standard 5.8 GHz DSRC link. Such a specification was only possible due to recent advances in DSRC standardisation.

4.2.2 Effects on telematics industry

During and after the implementation, the few effects which could be observed were small in magnitude., e.g. manufactures and suppliers of freight and fleet management increased their advertisement. Much bigger impacts were expected e.g. development of add on equipment etc..

4.2.3 Effects on transport industry

During 2001 considerable effects on the fleet composition could be observed, a huge renewal and change of the Swiss vehicles took place.

The VSAI (Association of Swiss Automobile Importers) sales statistics for the period 1997 to 2000 provide a clue: according to these statistics, the sale of delivery vehicles in 2000 was up by an average of 15 % on previous years (1997 up by 11 %, 1998 up by 19 %). It is therefore not possible to speak of a clear shift from HGV to light commercial vehicles, at least on the basis of new vehicle sales, especially if we consider that the sale of HGVs increased in average by a dramatic 45% in the same year. With this development (which has not continued in 2001 for understandable reasons) the move towards low-emission vehicles fleets suffered a setback. At the same time a clear trend towards heavier vehicles could be observed.

4.3 Observed effects during first year after introduction

4.3.1 Observations on traffic and transport volumes

Traffic situation in general

During 2001 three problems related to traffic volumes on Swiss roads caused big headlines inside and outside Switzerland:

- On several days during the whole year, the traffic at the border stations of BWA and Chiasso collapsed.
- Similar gridlock occurred on A2 motorway on the transit route over the Gotthard on several days as well.
- Closure of Gotthard tunnel after fire incident on October, 24th.

The regular collapse at the motorway border stations had nothing to do with the levy of the LSVA. The border-station of Basel-Weil Autobahn is at the limits of its capacity, handling a daily load of 2000 to 2500 truck transits in the direction of Germany and 1500 to 2000 into Switzerland. The situation in Chiasso is very similar and due to the lack of space for expansion, the possibilities for improvement are limited.

Traffic situation at fee collation points on first days of operation

Introduction of the heavy vehicle fee on the first Tuesday of 2001 caused no significant delays or congestion at Swiss customs posts along the country's border.

Crossborder traffic in general

Crossborder traffic has generally increased since last year. Exact figures, taking account of the different effects (change of the national weight limit, detour traffic because of congestion at the BWA / shift to smaller border-stations) are not available yet.

In Chiasso 570'000 vehicles crossed the boarder northbound which reflects an increase of 5.8 %, the southbound traffic increased to 396'000 vehicles, which is 8 % more then in the previous year. The average increase in crossborder traffic is about 3-5 %.

Detour traffic / shift along the frontiers

Shift along the frontiers

A reduction in the heavy vehicle traffic on the Swiss side of the frontier between Basel and Koblenz was clearly evident. This decrease could be largely traced back to a shift in traffic to the road network north of the Rhine. It is likely, though it cannot yet be proven owing to a lack of counting points, that re-routing effects are also to be found on the south bank of Lake Geneva (certainly insignificant according to information from the customs authority), in the Rhine valley and in Tessin. In relation to the total amount of traffic, however, such shifts are not relevant.

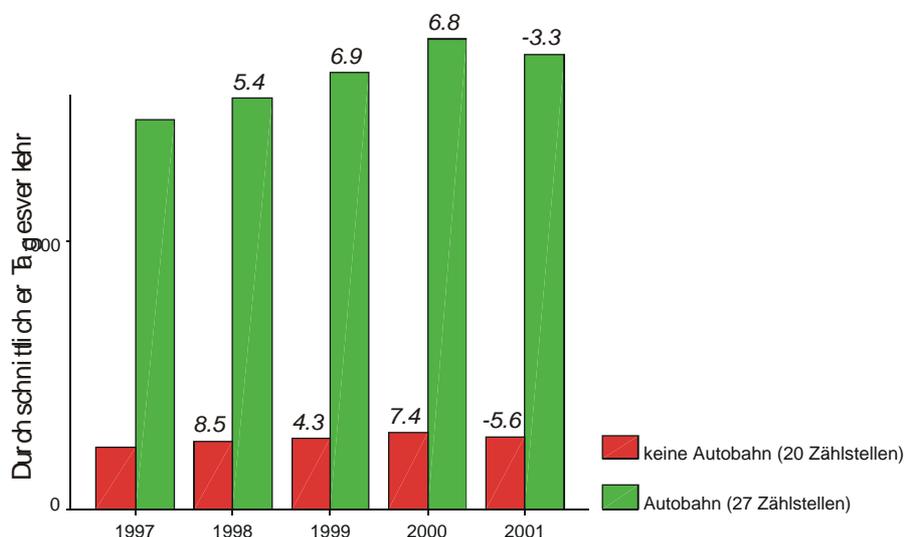
Traffic shift inside the Swiss border

The reduction in traffic revealed at individual counting points can be attributed with a greater or lesser degree of probability to the fact that drivers chose a shorter route. This is clearly apparent, for example, at counting point No 142 at Zofingen, where a decline of 5.4 % was revealed (January to July 2001 compared with January to July 2000). It is highly probable that this effect was the result of drivers choosing a clearly shorter route. In order not to diminish the plausibility of the results of the study, certain counting points, where the fall in traffic was clearly connected to the choice of a shorter route, were not taken into account in the overall assessment. The option - interesting in itself - of including the routes to which the traffic had (presumably) shifted, was unfortunately impossible, owing to a lack of LVCs. With the "by-passed" counting points left out of consideration, as stated, the idea that the trend towards a reduction in kilometre performance was due to the LSVA was certainly weakened but not refuted. One glance at the traffic counters, which are not installed on motorways, confirms this trend; although the problem of revised itineraries hardly arises in the case of the latter, heavy vehicle traffic tends to be on the decline there as well. Generally speaking, after the "by-passed" traffic counters have been left out of the equation, the results show a fall in kilometre performance of 3.3 % on the motorways and 5.6 % on other roads (see Figure 3)

Figure 4: Changes in number of class 4 (>12.5 m) vehicles

Entwicklung der Fahrleistung beim Strassengüterverkehr

(Fahrzeuge > 12.5 m: Veränderung gegenüber dem Vorjahr)



are

[ARE, (2001)]

The results of a first assessment of the LVC (Long Vehicles Counters) figures were unequivocal. While traffic in both classes steadily increased between 1997 and 2000, with average growth rates of 6 % for class 4 and around 5 % for class 3, the corresponding period in 2001 saw a clear 4 % decrease in traffic. This provisional finding called for closer analysis. In particular, it was necessary to determine

whether the result was influenced by the change in the choice of routes. In fact, closer examination reveals that such change does have certain influence. On the one hand, traffic takes alternative routes along the frontiers, the drivers being prepared to travel slightly longer distances; and on the other hand traffic leaves, or no longer uses, the major road network, as shorter alternative routes are to be found on the minor roads, and by taking them, drivers are able to save on the LSVA.

Fact: In the first year after its introduction, the LSVA has not merely counteracted the trend towards growth in road haulage traffic, it has even produced a slight decrease in kilometre performance across the whole of Switzerland.

[Balmer, (2001)]

Traffic situation on transit route Basel – Chiasso

Development January – October 2001¹

The HGV transit traffic on the Gotthardtunnel route increased last year approximately 8 % on average. About 4600 HGVs passed the Gotthardtunnel daily in January 2001 (working days only, both directions), and by July, this number had grown on peak days to 5500 HGVs.

4.3.2 Observation about shift from road to rail

Rail / SBB Cargo

According to information from the Swiss Federal Railway (SBB), freight carried by the SBB in the first half of 2001 had the effect of raising transport performance (measured in ton-km) by 1 %. This is no indication of a shift of traffic to rail; the increase in question could have occurred as a result of the greater efficiency achieved in the road transport sector. It is interesting to note the above-average growth of 8.7 % in internal traffic. Since the increase in the national weight limit has played a significantly smaller role in this field than in that of importing/exporting or transit traffic, this growth can be taken as an indication that the LSVA has succeeded in producing more significant effects here.

[Balmer, (2001)]

Use of Rolling Highway (Rollende Landstrasse)

Since the introduction of the LSVA a slight increase has been recognised, but it is quite difficult to detect the extent to which the increased number of transported vehicles is due to the LSVA.

¹ Due to the closure of the Gotthard tunnel from 24.10.2001 until 21.12.2001 no figures for this period are available.

4.4 Observation on LSVA collection system

4.4.1 System performance

The introduction of the LSVA on January 1, 2001, took place without any problems worth noting. Much to the surprise of many, there was neither increased queuing at the Swiss border stations nor protests or lack of co-operation by drivers.

OBU – TRIPON and DSRC road side equipment

The OBU and DSRC beacons are working to the full satisfaction of the system operator and users. Certainly, there were some minor start-up problems, but no important flaws have been discovered.

More than 50'000 TRIPON have been installed since June 2000. Less than 5 % of OBU's have been returned because of reported problems. Considering the harsh operating environment this represents an excellent figure that exceeds expectations. The failure rate of the DSRC communication is less than 0.1%.

Background system

Despite a short background system breakdown lasting about an hour on March 29th, 2001 no significant problems were reported.

Declaration and billing process

Initially billing was 2 months late because at a late stage in the introductory phase it was discovered that the vehicle data in the data base were partially incomplete or incorrect. This required a lot of manual interventions and time consuming clarifications. Since this delay, the system has caught up on the backlog of transactions and all invoices are going out now in time.

Exploitation of contingents

Against all exceptions, the contingents for 40-tonne trips relating to unladen vehicles and light loads were not exploited for the year 2001.

Enforcement and Security

At the moment no data is available about enforcement and security matters.

Observations at the roadside shows that this proves the efficiency of such simple but effective enforcement tools like the small LCD-lamps of the OBU to show the status of operation and the trailer declaration. It is very rare that trailers are not declared - easy detection and "social" checking mechanisms work to good effect.

Special regulations

The handling of the special regulations caused no operational problems. But special regulations offer a certain potential to fraud of the system.

Revenues

The revenues for the first year of operation of the LSVA were estimated at 600 Mio EURO (ca. 900 Million CHF).

The effective collected amount for the year 2001 will reach this estimations quite exact. Domestic vehicles generated about 430 - 450 Mio EURO (ca. 650 Million CHF) which is about 70% of the total amount, the revenues of foreign vehicles will be close to 130 Mio. Euro (ca. 200 Million CHF).

These figures include the refunds for UKV and wood transport is not yet considered.

4.4.2 Observed effects on transport industry

Fleet composition

The transport industry has adapted the fleet composition to the LSVA tariff: High-emission trucks have been replaced by new low emission vehicles. Also, the vehicle sizes have been adapted to the goods that are regularly transported (e.g. a carrier buying special low weight trucks if he runs a business transporting paper towels). This process has been noticeable well before the start date of the LSVA. In Switzerland the truck sales have been booming in the year 2000.

Regarding the light commercial vehicles the trends are still the same as in the previous years. There was still not a disproportionate increase in imported LCVs in comparison with matriculated LCVs during the year 2000.

Structure changing and logistics

Freight and fleet management activities have been increased in order to maximise the load factor. The trucking industry has been thoroughly shuffled. Trucking firms have merged or are co-operating in other forms in order to get a better chance for return freights.

In the key information survey interviews it was mentioned, that nearly one third of the small companies have been disappeared or merged. This figure must be verified by more detailed investigations.

Increased efficiency

Two indicators suggest that the main reason for the observed growth in kilometre performance is:

- The higher weight limit allows the transport of more goods with a kilometre performance that remains the same or even falls.
- The restructuring that occurred in the run-up to the introduction of the LSVA, together with logistical improvements (freight and fleet management), led to a clear reduction in the number of empty runs.

Transport sector / commercial prices

Transport cost has risen with the introduction of the LSVA. Mostly the LSVA is included in the tariffs, very seldom the LSVA is explicitly shown on the invoices.

No significant changes of retail prices could be detected yet. But more detailed investigation are needed.

5. Conclusions



“LSVA: Successful start”: Headline in the “Tages Anzeiger” of January 3rd 2001.

After the first year of operation this headline is still correct. The system for the collection of the Swiss Heavy Vehicle Fee LSVA is working very well, but with room for improvements of some of the operational processes.

After only one year of operation, it is difficult to give detailed information on the effects of the new fee on the traffic flow. Especially as the national weights limit has been raised from 28 to 34 tons simultaneously. Some changes of traffic flow along the border and within Switzerland can be observed. Compared with the total traffic flow these changes are not significant. More important is that the introduction of the LSVA, has not merely counteracted the trend towards growth in road haulage traffic, but it has even produced a slight decrease in kilometre performance across the whole of Switzerland.

It is nevertheless already evident that the LSVA, or to be more precise the dependence of the fee on the emissions and the weight of the vehicle, incite the vehicle owners to adapt their vehicle fleets. During 2000 a huge renewal of the Swiss HGVs fleets took place, a clear trend towards more specialised fleets and more clean vehicles can be observed.

For several areas like the effects on employment or the impact on transport and retail prices the short term observations are not likely to be representative for the long term effects of the LSVA. More detailed and long period investigations must be carried out to assess these long term effects.

Some quantitative targets of the LSVA, in particular the shift from road to rail, have not yet been achieved.

Regarding the generalisation of the results of the Swiss Case Study some attention must be given to the specific context of the LSVA system, and issues such as the Swiss political system, geographic conditions and the fact that Switzerland is not a member of the European Union. Nevertheless the experiences of Switzerland certainly serve as an important input to future IRPS projects.

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