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Size, structure and distribution of transport subsidies in Europe

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Preface

Every day millions of people and companies make transport-relevant decisions. Who and what is going to be transported, from where and to which destination, and how often? Which mode of transport should be used, via which route and in which driving style? Each individual decision is the result of an evaluation of the pros and cons of several options or — to put it in economic terms — of costs and benefits. Costs and benefits, and thus choices for or against each option are not only determined by transport policy but also by fiscal policy. It defines the level of charges, taxes and — last, but not least — subsidies on transport vehicles, fuels, infrastructure and services. To a great extent today's transport patterns in Europe reflect the way transport is treated by fiscal policy and has been treated in the past. Although a great deal is known on the role of charges and taxes in the transport field, very little real expertise exists on the level and effects of transport subsidies.

Based on the work of Transport and Environment Reporting Mechanism (TERM), energy subsidies and the use of market-based instruments, the European Environment Agency (EEA) carried out a project on 'The use of subsidies, taxes and charges in the EU transport sectors' and organised a workshop on transport subsidies in Copenhagen. These activities provided a fairly broad overview of the current level of knowledge and expertise on the methodology, definition and character of transport subsidies. However, it became obvious that information on the nature, size and distribution of transport subsidies are sketchy and far from impartial; they do not give a balanced picture that allows transport and fiscal policy decisions to take environmental aspects and unwanted side effects adequately into account.

This report summarises data on the size, structure and distribution of transport subsidies in Europe. It collects, structures and streamlines empirical findings from literature and expert knowledge, and puts them into context. In this way, the report improves transparency on the existence of transport subsidies, raises awareness on their financial and environmental relevance, and fosters efficient and consistent decision-making in transport policy.

The information provided in this report is useful for everyone interested in sustainable transport and subsidies, especially for those working in transport, fiscal and environmental policy who have direct or indirect influence on decision-making. This includes people in parliaments, governments and ministries and their administration. It also includes those who provide advice for these policy decisions, in particular people in technical authorities, advisory boards and expert groups as well as transport experts, consultants and journalists. Furthermore, this report may encourage discussion and serve as a starting point for future work on transport subsidies.

Prof. Jacqueline McGlade

Executive Director

Summary

With this report, the EEA aims to contribute to the discussion of how to estimate the actual value of subsidies that goes to the transport sector. As an illustration of the methodology developed and the data retrieved, the report identifies subsidies worth EUR 270 to 290 billion a year. This figure includes only direct transfers and tax deductions. It does not include more difficult to calculate issues such as value of privileged regulation, land-use policy, etc. The report is a first attempt to quantify the transport subsidies using a narrow definition specific to the aim of comparing all transport modes. Readers should take this into account when using the figures. The study does not distinguish between environmentally beneficial and environmentally harmful subsidies.

- Of the total, road transport receives EUR 125 billion in annual subsidies, most of which takes the form of infrastructure subsidies.
- Aviation is subsidised mainly via preferential tax treatment (exemptions from fuel tax and VAT). A total of EUR 27 to 35 billion per year was found.
- Rail is subsidised to the sum of EUR 73 billion per year. The financial benefit to the sector is split almost equally between infrastructure subsidies and fare reduction subsidies.
- Finally, water-borne transport receives EUR 14 to 30 billion.

The numbers given in this study have been derived mainly from literature and expert consultations. They thus represent an indicative estimate. Not all types of subsidies in all Member States are covered.

The total value of European transport subsidies remains unknown, and collection of all relevant data goes beyond the scope of this report. A complete evaluation of all transport subsidies in the EU would require a detailed analysis of the budgets of all Member States and municipalities as well as estimates of those subsidies that do not appear in public budgets.

Transport users tend to be unaware of the full cost of using transport. This is due to two factors. Firstly, transport systems are partly financed via public budgets. Secondly, external costs (e.g. environmental damage, congestion, etc.) are not fully internalised in the transport charges levied on the users. Several studies have addressed these external costs, but fewer attempts have been made to estimate the flow of money into the transport sector via public investments, direct operational support, tax exemptions, etc. Accordingly, the European Environment Agency (EEA) commissioned a study to summarise and structure data on transport related subsidies available in existing international studies and literature.

The aim of this report is threefold: to increase knowledge, to contribute to the discussion and to add to the **transparency** of the monetary flows in the transport sector. Thus the report also includes numbers on a range of elements (e.g. external cost, total fuel taxation, etc.) that fall outside the definition of the subsidies used in the study. This will allow users of the data to apply different definitions if relevant in different contexts.

The study looks mainly at the relative treatment of different transport modes. Consequently differences in treatment of different modes (e.g. on fuel taxation) are of primary importance.

Transport subsidies

The study focuses on subsidies which are paid directly from public budgets or affect public budgets via lower tax returns and where there is no direct service in return. The subsidies included are:

- Provision of infrastructure (direct infrastructure charges — e.g. bridge tolls — are subtracted).
- Other direct transfers that appear in public budgets (e.g. direct support to operators, alleviation of past debts, pension contributions, etc.).
- Differences in fuel taxation which constitute a subsidy because modes with lower fuel tax are granted a relative advantage compared to other modes.
- VAT exemption for certain segments of the transport market.

Transfers made to public transport operators which allow them to operate in more remote regions, at night or provide lower fares for special groups, such as children or the elderly are not included. This is due to the fact that there is a direct service in return, i.e. a transport service. Such payments are seen as a 'social subsidy' to specific groups.

Data on other economically relevant privileges, such as the existence of externalities or uneven regulation, are not included in the definition used in this study as the focus is on aspects of direct relevance to public budgets. Given this definition and incomplete data collection the estimates reported are likely to be conservative.

Findings

The table below summarises the subsidies found broken down by subsidy type and transport mode. The total value of subsidies that appear directly in public budgets (EUR 229 billion annually) greatly exceeds the value of tax and VAT exemptions (EUR 40 to 65 billion).

- More than two-thirds of the subsidies found in public budgets are for infrastructure. Infrastructure subsidies, however, only make up one half of the total subsidy.
- Around two-thirds of the infrastructure subsidy goes to road transport.
- Rail is the main recipient of other direct transfers.
- Fuel-tax and VAT exemptions are the most relevant subsidies for air and to some extent also waterborne transport.
- EUR 30 billion annually could not be assigned to one specific mode (e.g. support for multi-modal projects) and is therefore listed in the 'multiple modes' category.

In general, environmental objectives are not significant motivators for the bulk of subsidies. Rail transport subsidies however represent an exception, as they are sometimes justified on the basis of the better environmental performance of rail compared with road and air transport.

Transport subsidies in context

Transport has significant environmental effects, including air pollution, climate change, ecosystem fragmentation, loss of natural habitat and increased levels of noise. The total cost to society of transport

Overview of total annual subsidies found by incidence and mode (EUR billion, 2005)

	Infrastructure subsidies (only EU-15)	Other budget transfers	Fuel-tax exemptions	VAT exemptions	Total
Road	110	7	0	9	125
Rail	37	33	0–1	3	73
Air	0	1	8–16	18	27–35
Water	10	1	3–19	0	14–30
Multiple modes		30			30
Total	**156**	**73**	**11–36**	**29**	**269–293**

Note: Numbers may not add up to totals shown, due to rounding. Infrastructure subsidies equal the infrastructure costs minus infrastructure charges. For fuel-tax exemptions, low and high estimates are provided (based on minimum excise rate for diesel fuel and average CO_2 price in the European Emission Trading System in 2006); for road transport the tax rate for fuels exceeds the rates selected as references to calculate subsidies. This table is based on incomplete data. Therefore the total value of European transport subsidies remains unknown. In general data cover EU-25 (subject to data availability) except for infrastructure subsidies (only EU-15). However data availability in EU-15 is generally better than in the new Member States.

external cost not borne by the infrastructure users (albeit not defined as a subsidy in this report) has been estimated at EUR 650 billion.

It should be underlined that there are examples of environmentally friendly subsidies in the transport field, e.g. where subsidies allow for the construction of rail links that directly compete with air transport and thus reduce the external costs.

Transport subsidies mainly affect the environment by:

- influencing the **environmental performance** of vehicles;
- affecting **transport management** decisions about volume and composition of vehicle fleets, load factors, route planning, etc.;
- stimulating a **modal shift** from or to less environment friendly transport modes;
- inducing additional **transport demand**, for example by increasing the number of trips and their distances.

As subsidies can affect the environment on more than one level, a closer examination is needed before the environmental utility of the subsidy can be properly assessed. Furthermore, subsidised transport may also have some indirect and long term impacts, for example on urban sprawl and health. A detailed assessment of the environmental impact of each subsidy (and thus the overall effect of the subsidies found) goes beyond the scope of this EEA study.

Transport is subsidised and causes significant external effects, but there are several other economically relevant aspects that affect both the volume of transport and the balance between modes:

- Transport depends on a historic **infrastructure network**. Although this network is not considered a subsidy today in this study, it has been predominantly financed by public budgets in the past and still shapes present transport patterns. No financial effect of that has been included in the study.
- Transport is favoured by privileged **regulation and land use policy**, e.g. in the allotment of attractive and easily accessible parking sites in cities as well as the deregulation and liberalisation of transport markets. No financial effect of that has been included in the study for two reasons. Firstly, it was impossible to find enough of this information in the literature. Secondly, it is very difficult to calculate such off-budget subsidies.
- Private transport (predominantly road) however contributes to public budgets via significant tax revenues (more than EUR 200 billion). This revenue, which is comparable in size to the infrastructure subsidy, is in this study seen as a general contribution to public budgets, not as payment for the use of infrastructure.

1 Introduction

1.1 Background

European transport subsidies are substantial and have important economic, social and environmental effects. By providing financial benefits to consumers and producers, subsidies lower the costs of transport, thereby encouraging additional transport and increasing the overall volume of traffic. In addition, government subsidies to specific modes of transport encourage the use of some modes over others, because the resulting drop in user costs leads some transport users to switch to other subsidised modes.

The size, structure and distribution of transport subsidies within the European Union are not systematically monitored, making the data on transport subsidies scattered and incomplete. Without this information, political decisions to support transport are not always well balanced and consistent. They do not adequately take environmental aspects and unwanted side effects into account.

The European Environment Agency (EEA) commissioned this study to gain better information on the size, structure and distribution of transport subsidies in the European Union. This is intended to give policy makers a better understanding of the environmental dimension of transport subsidies and complements other work being conducted by the EEA, in particular on the Transport and Environment Reporting Mechanism (TERM). The level of subsidies to transport is only one of many determinants of the prevailing transport and mobility patterns in Europe. However, it is not a well ascertained one.

In a precursor study conducted in 2005, the EEA sought to understand the nature, effects and categories of transport subsidies. Part of that study constituted the creation of a substantial literature database which compiled information on the relevant literature into a searchable repository ([1]). The current study furthers this past work by systematically collecting and categorising the actual monetary value of transport subsidies in the European Union. These values are presented in this study as annual estimates.

1.2 Study approach and methodology

This project collected data on all kinds of fiscally relevant, transport-related subsidies that directly or indirectly affect the environment. Within the scope of this project, it was not feasible to provide a complete overview of all data on all types of fiscal and non-fiscal support for all transport modes and all EEA Member States. In order to provide a result that is as consistent and comprehensive as possible, the project team focused on gathering data from existing international studies. Only limited data gathering from Member State contacts was conducted. Data were not gathered directly from national accounts, but mainly from literature. Hence, the data found may not reflect some specific national transport subsidies that — for whatever reason — are not covered by the studies analysed for this report. Given that the data collection was not exhaustive for all subsidies in all Member States, the aggregate numbers presented in this study should be considered a lower boundary for the overall level of European transport subsidies. In principle data cover EU-25 but in many cases with a better data availability for EU-15.

The primary focus of this study was to find the aggregate monetary value of each transport subsidy. This is comparatively more difficult than gathering information from Member States on the legal and administrative details of payment, taxation or charging that lead to subsidies. This is one of the key reasons that this project relies on previous international studies rather than the direct contact of government offices. To give a concrete example, information on income tax deductions for commuters (in euro per kilometre) was available in some countries, but without corresponding information on how much this represents in total tax deductions within these countries. Information on the legal and administrative details of each subsidy was not systematically collected and compared.

In September 2006, an expert workshop brought the project team and other selected European experts together to discuss the data collected and the preliminary research findings. In addition, the project team contacted additional experts early on in the research as a means of locating data sources and

([1]) See Ecologic, 2005.

expediting the research process. These experts were also involved in a review of preliminary results and a draft report. The comments of these experts have proven very helpful and are reflected in this report (see Annex 1 for the list of experts consulted).

Data on European transport subsidies are not regularly and systematically collected. Instead, data on specific subsidies have been collected in ad hoc international and national studies. The study relies on this literature, which extends from studies conducted as early as 2000.

To obtain estimates of annual transport subsidies from the gathered data, two types of double counting were removed from the data. First, intra-year double counting was removed, which occurred whenever two or more studies covered the same subsidies in the same year. In addition, inter-year double counting was removed (i.e. only the most recent year of data for each subsidy was retained). Data were also converted into consistent monetary units (i.e. 2005 EUR). These data were then combined to generate estimates of annual European transport subsidies. The assumption behind this methodology is that the subsidies found continue to exist at the same levels as the last time they were studied in the surveyed literature. More information on this methodology and its implications for data quality can be found in Chapter 5.

1.3 Structure of this report

Chapter 2 provides an overview of the definitions and classifications of transport subsidies as they are used in this report. The chapter explains the concepts of on-budget and off-budget subsidies and introduces the classifications of incidence and mode.

Chapter 3 presents the numerical findings regarding the size, structure and distribution of transport subsidies in Europe.

Chapter 4 addresses a number of issues that are related to transport subsidies, but which are not covered by the subsidies definition used in this study. These issues include public service obligations, externalities, transport infrastructure and regulation.

Chapter 5 provides an assessment of the quality of the data collected in this study. The implications of missing data, biases, and assumptions for the reliability and usability of the data are explored.

Chapter 6 offers the key conclusions of the study.

Annexes — two annexes provide further detail on the data: a list of sources and experts consulted (Annex 1); and a brief guide to the most important literature sources for the data (Annex 2).

Result limitations

This report is the first ever attempt to estimate the total amount of subsidies to the transport sector in the European Union. Based on available sources, four subsidy categories have been examined: infrastructure subsidies (EU-15), other on-budget subsidies, fuel tax exemptions and rebates as well as VAT exemptions and rebates. Subsidy amounts have been quantified for these categories for 2005.

The results should be used with care. The figures given in this report are calculated on the basis of several assumptions, delineations and limitations.

Reliable data on infrastructure subsidies are lacking for the new Member States. Tax revenues from the transport sector are not taken into account. The estimation of infrastructure subsidies includes only charges on infrastructure use (see Section 3.2.1). Exemptions and rebates from fuel taxes and VAT are covered; however, there is debate on the appropriate reference tax level (see Section 3.3 and 3.4).

Public service obligations (e.g. payments for public transport services), and externalities (e.g. the failure to internalise external costs of transport) are not regarded as subsidies in this report (see Section 4.2.1).

Not all subsidies could be included in this report. The figures provided are based on incomplete data; therefore the total value of European transport subsidies estimated in this report is rather conservative.

There are still many questions to be answered and data to be found before a more solid estimation of subsidies in the transport sector can be obtained. The reader is advised to quote the monetary figures of this study along with an explanation of the assumptions, delineations and limitations behind them.

2 Definition, classification and environmental relevance of transport subsidies

2.1 Definition of transport subsidies

Definitions of the term 'subsidy' differ widely. On the one hand, a broad welfare economic approach defines 'transport subsidies' as all transport costs that are not covered by users, including all kinds of externalities, infrastructure costs or different regulation (Nash, 2004). On the other hand, a fiscal policy approach defines 'subsidies' as only those economic advantages that are granted from public budgets that do not provide a direct service in return, e.g. grants and tax deductions. Both approaches have their advantages and disadvantages in different contexts. However, the implications for the delineation of subsidies are very different, affecting for example the extent to which external costs are to be taken into account. Given the focus of this study and in the light of other transport-related EEA activities and products, this study relies on a fiscal policy approach. This necessarily excludes many economically relevant transport issues (for a discussion of some of these issues, see Chapter 4: 'Subsidies in context') ([2]).

Even within a fiscal policy approach, there is no single definition of subsidies among European Member States ([3]). Therefore, this study uses as its starting point a definition that has been employed in several recent OECD publications, namely: subsidies as 'a result of a government action that confers an advantage on consumers or producers, in order to supplement their income or lower their costs' (OECD, 2005, p. 16). This definition would include activities such as direct payments from government budgets, tax exemptions and rebates as well as subsidies stemming from regulatory preferences beneficial to certain market actors (e.g. preferential market access, accelerated depreciation, limited liability, 'soft' loans, and special exemptions from regulatory requirements).

Only fiscal support with direct relevance to public budgets that have no direct service in return are considered as 'subsidies' in this study. This includes infrastructure cost. Under this definition, government payments to provide public service obligations (PSO) that ensure a sufficient quality of public transport services are not regarded as subsidies ([4]).

The subsidy data collected for this study include both 'on-budget' and 'off-budget' subsidies. The EEA defines 'on-budget subsidies' as 'cash transfers paid directly to industrial producers, consumers and other related bodies … (that) appear on national balance sheets as government expenditure'. The EEA defines 'off-budget subsidies' as 'transfers to … producers and consumers that do not appear on national accounts as government expenditure(s)' (EEA, 2004, p. 11). Examples of on-budget subsidies include direct government payments out of public funds, whereas tax exemptions and rebates would be off-budget subsidies. It is significantly easier to obtain definitive statistics for on-budget subsidies than to obtain accurate data for off-budget subsidies ([5]).

2.2 Classification of transport subsidies

Transport subsidies can be classified by 'incidence' and by 'mode'. The term 'incidence' refers to who or what initially receives the subsidy. Although subsidies often flow through to other end beneficiaries (their 'final incidence'), knowing the initial incidence helps to understand what specific kinds of activities are being encouraged. Incidences relate to the incentives being created by subsidies. The directly relevant incidences for transport subsidies are infrastructure, fuel, means and vehicles as well as users and services. Other incidences exist as well, such as subsidies for housing, regional settlement and trade. Table 1 provides definitions for each incidence and categorises the subsidies quantified in this study according to their incidence. Note that on-budget subsidies were found for three incidences: infrastructure, means/vehicles and users/services. Due to the large number of

([2]) For further information on the definition and classification of transport subsidies, please see Ecologic (2005, pp. 2–13).
([3]) Though not the formal definition of subsidies used in this study, a related concept is that of 'State aid', which is central to subsidy control in the EU and included here for context. To be considered State aid, a measure must meet all four of the following criteria: 1) granted by a Member State or through state resources; 2) favour certain undertakings or the production of certain goods; 3) distort or threaten to distort competition; and 4) affect trade between Member States. Source: Article 87(1) of the EC Treaty, available at http://ec.europa.eu/comm/competition/legislation/treaties/ec/art87_en.html.
([4]) The issue of PSO is discussed in Chapter 4.
([5]) To determine the exact value of tax exemptions, for example, requires detailed knowledge of demand elasticities and, in some cases, sophisticated economic modelling techniques. Such techniques were not used in this study.

specific subsidies found and the difficulty of clearly classifying some subsidies into one incidence or the other, subsidies to means/vehicles and users/services are grouped into the classification 'other on-budget subsidies'.

This study also distinguishes subsidies by the four main modes of transport: road, rail, air and water. Some subsidies also support combined transport. This study does not, however, provide data broken down by further sub-classifications of these mode types (e.g. passenger, freight, and transit).

2.3 Environmental impacts of transport subsidies

Transport has significant environmental effects. These effects include air pollution, climate change, ecosystem fragmentation, loss of natural habitat and increased noise. Transport accounted for 30.7 % of energy use in the EU-25 in 2004 — more than any other sector (e.g. industry, households, and services) ([6]). Subsidising transport is therefore potentially very harmful to the environment. This is obviously the case if subsidies foster transport growth or make it harder for less environmentally harmful transport modes to compete. Tax exemptions for aviation, a major contributor to climate change, are an example.

Nevertheless, it is too simplistic to label all transport subsidies as environmentally harmful, as there are lots of examples of environmentally friendly subsidies within the transport field.

Transport subsidies affect the environment at four different levels:

1) They influence the environmental performance of vehicles. Subsidies may provide incentives for cleaner engines or advanced technology and can bridge the gap between the costs of 'green' vehicles and others. They can also lessen the costs of meeting certain legal requirements for vehicle manufacturers and users, thereby reducing political opposition to stricter environmental regulations. Other subsidies (e.g. subsidies to diesel fuel) can have negative effects on some aspects of the environmental performance of the vehicles'.

2) They affect transport management decisions about volume and composition of vehicle fleets, load factors, route planning, etc. This may change the relationship of the costs and benefits of investments in transport services and logistics.

3) They affect modal share by altering the price competitiveness among different modes of transport. Subsidies may reduce or increase the competitiveness of sustainable transport modes and lead to a shift from one means of transport to another.

4) By lowering the costs of transport, subsidies increase transport demand, i.e. the number of trips and their distances. The resulting transport growth affects the environment through higher emissions, increased need for infrastructure, urban sprawl, habitat fragmentation, etc.

Table 1 Classification of transport subsidies

Initial incidence	Description	Relevant subsidies quantified in this study
Infrastructure	Public spending on transport infrastructure network (roads, rail, waterways, airports and air traffic control) including investment, running and hidden costs; minus charges for use or access to infrastructure	Infrastructure subsidies
Fuel	Subsidies for production, distribution and use of fuels	Fuel-tax exemptions and rebates
Means/vehicles	Subsidies for production, distribution, use and disposal of vehicles	Other on-budget subsidies
Users/services	Subsidies for transport provisions and activities of companies, households, private and public institutions, including subsidies to operators for reduced fares	VAT exemptions and rebates; Other on-budget subsidies
Other	Subsidies with indirect impact on transport demand (e.g. for housing, building, settlement, regional development, trade and distribution)	Note: subsidies with indirect transport impacts are not quantified in this study

([6]) Energy use data from Eurostat (2006). Final energy consumption, by sector. Available at http://epp.eurostat.ec.europa.eu.

In most cases, subsidies affect the environment on more than one level. Some of the indirect impacts can support the intended effects or counter-balance them. Grants for low-noise trains improve the environmental performance of trains directly. However, they also affect transport management and support modal shift. Subsidies to railway users may not only encourage modal shift, they also increase transport demand and lead to additional and longer trips. If a subsidy has environmental impacts at several levels — some positive, some adverse — it is not easy to assess the overall environmental effect. Subsidies for a rarely used train connection or grants for environmental improvements on airplanes might require closer examination before an assessment of their environmental utility can made.

Many impacts of transport subsidies, especially where they affect transport demand, are of an indirect nature and become effective only in the long term. The availability of cheaper (in the sense that users do not pay the full cost) and faster transport — often combined with subsidies for housing — affects peoples' choices of residence and the location decisions of businesses. The consequences are longer distances between homes, workplaces and shopping facilities, and thus more transport. Such developments are path dependent in the literal sense and are consequently difficult to change or reverse.

2.4 Subsidy impact on sustainable transport

The main objective of transport policy is to improve the ability of people and goods to move and to reach other places. Mobility and access enable people and business to fulfil their demand for goods and services, ensure social inclusion, allow efficient business cooperation, and provide for a dynamic economy and an agile society. Transport is one key to efficient mobility and access (however, not the only one). Making transport cheaper through subsidies would seem to be a purely positive step towards fostering common welfare. Although this rationale is very common, it is nevertheless mistaken. Cheaper transport may not only improve mobility and access, it may also have some unwanted impacts in the long run, for example on urban sprawl and human health.

2.4.1 Transport and urban sprawl

Cheaper and faster transport is a main driver of urban sprawl (EEA report 10/2006). Combined with subsidies for housing it affects people's choices of residence and business' decisions about selecting locations. One by one, each individual household's decision to move further away from a city centre contributes to urban sprawl and changes commuting and travel patterns. The consequence is longer distances between homes, workplaces and shopping facilities, and thus, more transport.

Cheap transport also improves people's access to more distant shops and services. This affects the local distribution within the retail sector. Shops and supermarkets need not be located close to people. They can move wherever costs are low. This contributes to the ongoing concentration process in the retail sector and results in fewer and bigger markets. The (re-)location of shops and other services reduces convenience within residential neighbourhoods. In that way, subsidised transport may result in reduced access to shops, services and social contacts for many people — children, elderly, handicapped, and low income groups. This in turn increases dependency on motorised transport means. A consequence might be increased traffic due to more vehicles on the road, more trips and longer distances. All in all, this adds up to reduced mobility and access for many people.

Urban sprawl and less densely populated areas also influence the choice of transport modes. Trains and bus services are most cost-effective where many people are moving from one place to another. The cost-effectiveness of public transport depends on population density. In general, the higher the population density the lower the average costs of public transport. Thus, a low population density makes public transport less attractive and more expensive. Without additional funding from public budgets, fares have to be increased or service quality reduced. As a consequence, urban sprawl fosters a modal shift away from public transport and an even higher dependency on cars. Furthermore, it becomes more expensive for the state to fulfil its public service obligation guaranteeing basic public transport services.

2.4.2 Induced transport and decoupling

Cheaper and more attractive transport generates additional transport demand (e.g. additional trips or further destinations) that causes more environmental, health and urban problems. This induced transport growth increases the risks of congestion with all its negative consequences, such as the growing pressure of building new roads. Cheaper transport makes the economy and society more dependent on transport. Ironically, it requires greater efforts to avoid or reduce the

negative environmental and health effects. More public spending on transport infrastructure is not always the best way out. On the one hand, it can ease traffic flow, reduce congestion and save travel time on some routes. On the other hand, it also makes transport faster and easier, and induces additional traffic. This may cause further bottlenecks and congestion in other locations ([7]). Other ways of dealing with congestions, including transport demand management and urban planning, might be more effective than funding transport infrastructure.

2.4.3 Indirect health effects of transport

When it comes to the health effects of transport people usually refer to the impairment of health due to accidents and the emissions of noise and air pollutants. Another long term health effect of increased motorised transport is the growing physical inactivity of people. For many people car ownership brings a lifestyle with less physical exercise. Cardiovascular diseases and obesity are some of the detrimental consequences. According to WHO the prevalence of obesity has increased by 10–40 % from the late 1980s to the late 1990s within European countries. Transport growth contributes to this development. Busy roads and easy access to motorised transport make it less attractive to walk or cycle, even for short distances. In particular, children suffer from this unhealthy development: WHO data show that obesity is on the increase among European children, while the levels of physical activity, in particular cycling and walking, are declining.

Children who are not allowed to run and play on the streets on their own because of traffic not only have reduced physical skills but may also be restricted in their social development. They are unable to meet friends spontaneously, organise circles of friends independently or have experiences unattended by adults. If young parents move to the suburbs to avoid this dissatisfying situation, they again foster urban sprawl and traffic growth. Public spending on new roads and subsidies of private transport and housing aggravate this development.

([7]) Studies show that transport demand — on average — changes at the same rate as travel time. For example a 10 % reduction in travel time due to a new road or an extra lane on the highway leads to additional transport growth between 5 and 10 % (for rural, less populated areas, induced transport is more relevant than for densely populated regions).SACTRA (1994): The Standing Advisory Committee on Trunk Road Assessment, Department of Transport: Trunk Roads and the Generation of Traffic. London; UBA 2005: Umweltbundesamt: Determining Factors of Traffic Growth — Developments, Causes and Possible Future Directions; UBA-Texte 32/05; Dessau (Germany), p. 50.

3 Empirical findings of European transport subsidies

The data collected for this study allow estimation of values of annual European transport subsidies. Due to missing data and methodological constraints, the figures presented should be considered as a lower boundary for the actual level of European transport subsidies. Despite the fact that the transport subsidy picture is still incomplete, these data provide useful information on the size, nature and distribution of European transport subsidies.

The presentation of the data follows the definition and classification scheme introduced in Chapter 2. Empirical findings are organised by subsidy type, incidence and transport mode. The types of subsidies presented include on-budget subsidies: infrastructure costs and revenues from infrastructure-related charges exemptions and rebates from fuel excise taxes, and VAT exemptions and rebates on passenger services. Further methodological considerations can be found in Chapter 5.

3.1 Total transport subsidies

This study found annual EU transport subsidies of between EUR 269 and 293 billion. The width in the range of estimates — most significant for road transport — is due to varying interpretations of how to categorise infrastructure charges and fuel taxes (discussed later in this section). Table 2 provides an overview of the subsidies found, broken down by subsidy type and transport mode. The total value of on-budget subsidies (EUR 229 billion annually) greatly exceeds the value of off-budget tax exemptions and rebates (EUR 40 to 65 billion). More than two thirds of on-budget subsidies are for infrastructure. Other on-budget subsidies are most significant for the rail sector, whereas the off-budget subsidies stemming from tax exemptions and rebates are most significant for the air sector. Not all on-budget subsidies could be attributed to a single mode; EUR 30 billion annually fall into this 'multiple modes' category.

3.2 On-budget subsidies

3.2.1 Infrastructure subsidies

Public expenditures on investments and running expenditures for the maintenance, improvement and enlargement of infrastructure are a major source of fiscal support for transport. Unfortunately, there is no reliable set of European statistics available on Member States' actual expenditures on transport infrastructure. Data on infrastructure costs are available from other studies, however. These infrastructure costs are not calculated on the basis of actual government spending, but rather on the annual amortisation of the total value of infrastructure plus running costs. Though the differences between expenditures and costs can be significant, data on infrastructure costs

Table 2 Overview of total annual subsidies found by incidence and mode (billion 2005 EUR)

	On-budget subsidies		Off-budget subsidies		Total
	Infrastructure subsidies (EU-15)	Other on-budget subsidies	Fuel-tax exemptions and rebates	VAT exemptions and rebates	
Road	110	7	0	9	125
Rail	37	33	0–1	3	73
Air	0	1	8–16	18	27–35
Water	10	1	3–19	0	14–30
Multiple modes		30			30
Total	156	73	11–36	29	269–293

Note: Numbers may not add to totals shown due to rounding. Infrastructure subsidies equal infrastructure costs minus infrastructure charges (see Box 1 on page 14). For fuel-tax exemptions and rebates, low and high estimates are provided; for road transport the tax rate for fuels exceeds the rates selected as references to calculate subsidies. For further methodological details — see Chapter 5. This table is based on incomplete data; the total value of European transport subsidies remains unknown. This note must accompany any use of this table.

are a useful proxy for expenditures. The UNITE project ([8]) has studied public accounts in the EU-15 in detail and provides data on infrastructure costs and charges. These data represent a useful source of information on public infrastructure costs and are used here as a proxy for the inadequate data on the annual public expenditures on transport infrastructure in Europe ([9]).

Figure 1 gives an overview on the UNITE results. They include both charges that are labelled to cover infrastructure costs, e.g. Eurovignette charges, and other charges which are indirectly related to infrastructure use, e.g. circulation, vehicle, registration, insurance and vehicle sales taxes as well as excise taxes on fuels. In some European countries, the latter are at least partially regarded as contributions toward infrastructure costs as well. In other countries they are regarded as general taxes. In UNITE all these other types of transport charges are not included in infrastructure charges. Figure 1 shows infrastructure costs, infrastructure charges and other charges. In this study, net public expenditures on infrastructure are considered as a form of subsidy (it should be noted, however, that this perspective is debatable, see Box 1). Some official bodies use another delimitation and exclude net public expenditures on infrastructure from their definition of subsidies ([10]).

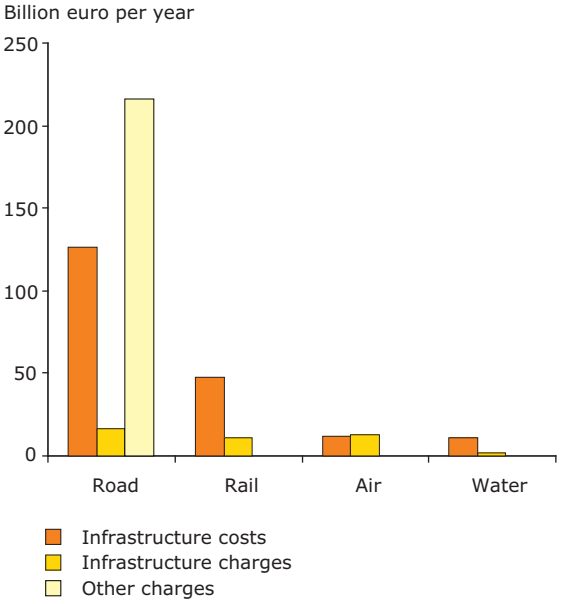
It is worth mentioning that international funds, like TEN-T and the funds from the EU cohesion policy, provide an important source of subsidies for transport infrastructure. Since the figure for infrastructure subsidies is based on costs rather than expenditures, the origin of the fund is not reflected in the numbers given in Table 1.

For rail, infrastructure charges are much lower than the infrastructure costs. This yields a high level of subsidies (approximately EUR 36 billion per year). Depending on whether one credits 'other charges' as infrastructure charges, road-infrastructure subsidies could range from zero to as high as EUR 10 billion. The graph also contains data for aviation and waterborne transport, but the UNITE data for these modes are considered less reliable than for the other two modes.

3.2.2 Other on-budget subsidies

In addition to infrastructure subsidies paid out of public budgets, all modes of transport receive other forms of on-budget subsidisation. However, there are significant differences between the modes in terms of the level of subsidies found. Other on-budget subsidies to rail are significantly higher than for other modes, with rail receiving EUR 33 billion in non-infrastructure on-budget subsidies per year (see Figure 2). Rail also receives the highest share of subsidies going to transport services. Most of these payments cover railway operating losses, paying for the alleviation of past debts as well as paying employee salaries and pensions. Note that public spending for public service obligations (PSO) are not included here. In addition, rail also receives significant subsidies

Figure 1 Annual infrastructure costs and charges, EU-15 plus Hungary (EUR billion 2005)



Note: UNITE data for aviation and water-borne transport are considered less reliable than for the other two modes.

Source: UNITE.

([8]) UNITE stands for UNIfication of accounts and marginal costs for Transport Efficiency, and was funded by the European Commission within the 5th Framework Programme.

([9]) Despite some methodological drawbacks UNITE data are the most complete and uptodate on infrastructure costs for the EU-15 as a whole. The European Conference of Ministers of Transport (ECMT) is currently working on an overview of infrastructure costs, but these results are not expected to be ready in time for this study.

([10]) E.g. the WTO and EU State Aid rules.

Box 1 Fuel and vehicle taxes and infrastructure funding

Unlike in the USA where in most states taxes on fuel are hypothecated (earmarked), in most European states the greater part of revenues from fuel and vehicle taxes are not earmarked for financing transport infrastructure. There is a discussion on the relationship between transport related taxes and infrastructure funding. The two main perspectives can be summarised as follows:

- On the one hand, fuel and vehicle taxes are regarded as a charge for funding infrastructure. This perception is justified by the 'benefit principle' (also known as 'principle of equivalence') — an important taxation principle — which requires that each tax payer should be taxed according to the benefit he gains from services and goods provided by the state.

- On the other hand, taxes on fuel and vehicles are regarded as fiscal contribution to general budgets. This avoids the inefficiency of having to earmark where public expenditures are driven by the development of revenues and not by the importance Parliament ascribes to the infrastructure. Due to the fact that mileage and car ownership of private households — on average — correlate with their income ([11]), this perspective is in line with the 'ability-to-pay principle', whereby the individual level of taxation should reflect the tax payer's situation of wealth and income.

It is not feasible to make a clear distinction between the two perspectives. The EEA favours the second option, i.e. to regard fuel and vehicle tax revenues not as infrastructure charges. First of all, transport costs — including the payment of fuel and vehicle taxes — constitutes a deduction of other taxes, e.g. corporate and income tax ([12]). Secondly, the widespread attitude to demand free provision of road infrastructure as a service in return for fuel and vehicle taxes undermines the fiscal balance of state budgets, because in most states public budgets strongly depend on the revenues from these taxes. It is neither desirable nor possible to tax each group of tax payers in the same order of magnitude as this group benefits from public services. Therefore, this study chooses to use only direct user charges revenues as a reference for infrastructure subsidies. However, we try to make transparent the available figures on fuel and vehicle taxes (see Figure 1) and leave it to the reader to draw a different conclusion from the information provided in this report.

directly to transport users (EUR 15 billion) in the form of concessionary fares.

Many of the on-budget subsidies found could not be attributed to a particular mode. This expenditure, totalling EUR 30 billion in subsidies, accounted for approximately 40 % of the non-infrastructure on-budget subsidies found. The majority of the funds falling into this category go to the road and rail modes, but due to their multi-modal character, they can not be attributed to a single mode. Very few on-budget subsidies going to a particular means of transport (e.g. vehicles) were found for any of the modes.

3.3 Differences in fuel excise taxes

Differences in fuel excise duties could be interpreted as preferential taxation, and thus also seen as off-budget subsidies. To estimate these subsidies for each mode, it is necessary to subtract actual excise taxes collected for the mode from the hypothetical excise taxes that would have been collected if the mode's fuel taxes were set at the standard (i.e. higher) rate.

To calculate the actual fuel excise taxes per mode, the energy consumption of each mode was multiplied by the current fuel excise duties,

([11]) Until a few decades ago, owning a car and driving was seen as an expression of reasonable income and fairly wealthy status. Due to the extraordinary importance of private cars for modern life and society this perception has changed. Nevertheless, there is still empirical evidence that — on average — a household's income correlates with the number, size and mileage of cars.

([12]) In some countries such as like Germany and Austria commuters can deduct some parts of their travel costs to and from work from their income tax. An Austrian study calculated that fixed tax allowances for commuters and flat-rate tax deductions per kilometre add up to EUR 136 M. a year in Austria (Prettenthaler *et al.*, 2004). A Hungarian study shows that the governmentally tolerated practice of accounting private use of passenger cars as company costs leads to a loss of revenues of more than HUF 800 billion (approximately EUR 3 billion) in 2004 (Clean Air Action Group Hungary, 2006). Furthermore, refunding fuel taxes for some vehicles, in particular for trucks, reduces the total revenue from these taxes (ECMT, 2004).

expressed as euro per unit of energy ([13]). To calculate the level of subsidy, the choice of a reference value (i.e. the tax level that is considered the baseline) is crucial. The choice of this value is in some ways arbitrary. Based on discussions with experts, two reference cases were chosen:

- minimum fuel excise duty for road diesel (according to Directive 2003/96/EC) ([14]);
- price of the CO_2 emission allowance in the European Emission Trading Scheme (EU ETS), according to an estimated 2006 average price of EUR 20 per tonne ([15]).

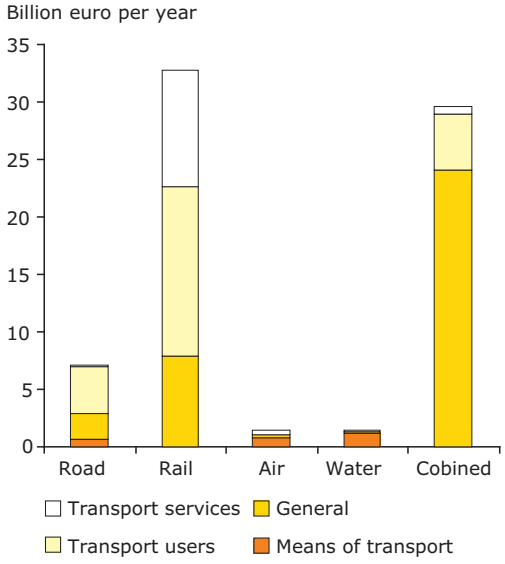
Figure 3 shows the various levels of off-budget subsidies that emerge from these hypothetical baseline tax rates. Using the price of carbon permits as the baseline yields a lower level of subsidies. Using the road fuel excise taxes as the baseline yields a higher level of subsidies. As can be seen from the chart, the air and water modes, which benefit from significant tax breaks on fuel, receive the highest levels of off-budget subsidies through fuel-tax exemptions and rebates.

The road mode receives no subsidies under the two hypothetical reference levels. This is because 1) road excise duties are higher than the cost of the relevant number of CO_2 emission allowances, and 2) average excise tax rates on road fuels in the EU exceed the Fuel Directive's minimum duty.

3.4 Exemptions and rebates from VAT on passenger services

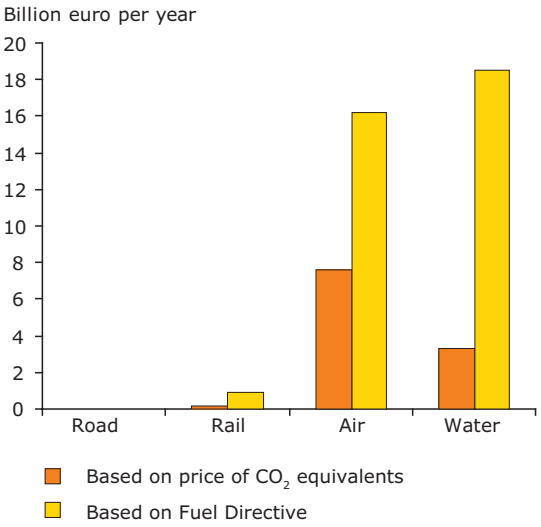
Passenger services are frequently subject to lower VAT rates than are standard in EU Member States. These differences in VAT rates could also be

Figure 2 Other on-budget subsidies by incidence and mode (billion 2005 EUR)



Note: This graph is based on incomplete data; the total value of European transport subsidies remains unknown. This note must accompany any use of this graph.

Figure 3 Value of exemptions and rebates from fuel-excise taxes (based on hypothetical baseline tax rates)



Note: This graph provides estimates of the value of fuel-tax exemptions and rebates based on reference values selected by the study authors. This note must accompany any use of this graph.

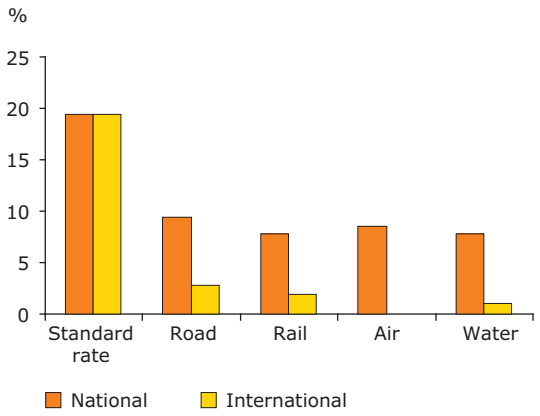
([13]) The data for this calculation were obtained from the EEA's TERM fact sheets.

([14]) It should be noted that several of the experts consulted addressed the problem that the reasons for the level of diesel taxes do not fully apply to fuel taxes of other modes. The authors of this study are aware of these problems and regard the results of this reference case as an absolute upper limit of fuel subsidies.

([15]) Other experts objected to the use of CO_2 allowance prices because, as a reference, it has no basis in the fiscal approach used in this study. We acknowledge this issue, but find it to be the best reference for establishing a meaningful lower limit of subsidies stemming from fuel-tax differences. For aviation, the IPCC correction factor of 2.7 has been applied to account for the additional climate impacts of aviation beyond CO_2 emissions.

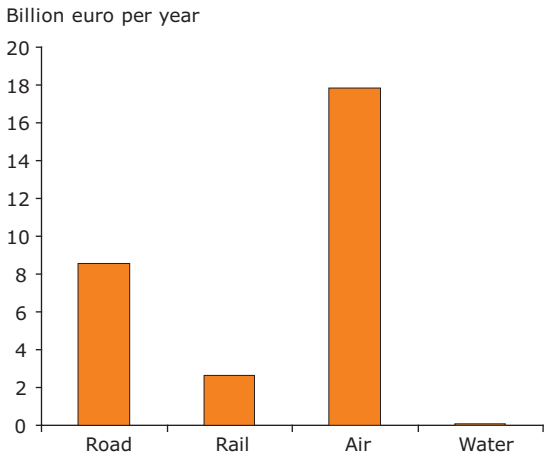
interpreted as off-budget subsidies. To compute these subsidies, we gathered Member State data about standard VAT rates and VAT rates for domestic and international passenger transport services. Figure 4 shows the average VAT rates for passenger transport in the EU-25.

Figure 4 Average VAT rates passenger transport in EU-25



Source: European Commission (2006).

Figure 5 Hypothetical extra tax burden per year with standard VAT rates, EU-25 (billion 2005 EUR)



Note: This graph provides estimates of the value of fuel-tax exemptions and rebates based on reference values selected by the study authors. This note must accompany any use of this graph.

By multiplying these differences by the revenue of the various modes, the total value of VAT exemptions and rebates for passenger services was estimated for each mode ([16]). Figure 5 shows these estimated values. Air travel, which is exempt from VAT on international flights, receives off-budget subsidies worth over EUR 18 billion annually in the EU-25 due to this tax exemption. VAT exemptions and rebates on passenger services generate just over EUR 8 billion in off-budget subsidies for the road sector and over EUR 2 billion for rail. VAT applies to only a very small portion of shipping.

3.5 Summary by mode

The subsidy profile is significantly different between the modes. Specifically:

- **Roads (EUR 125 billion in annual subsidies identified)**. The vast bulk of road transport subsidies consists of infrastructure subsidies (EUR 110 billion). This is the case under the assumption that certain taxes paid by motorists are not interpreted as user charges for road infrastructure.
- **Rail (EUR 73 billion in annual subsidies identified)**. Of this infrastructure subsidies constitute the largest share (EUR 37 billion) closely followed by other on-budget subsidies (EUR 33 billion).
- **Air (EUR 27–35 billion in annual subsidies identified)**. Subsidies — in the form of exemptions and rebates from fuel taxes as well as VAT on international flights — are the most important source of subsidies.
- **Water (EUR 14–30 billion in annual subsidies identified)**. In comparison to the other modes, the level of transport subsidies found for water is significantly lower (just over 10 % of those found for roads). Infrastructure subsidies are a significant portion of overall subsidies going to water transport, accounting for 30–70 % of the subsidies identified for this mode.
- **Multiple modes (EUR 30 billion in annual subsidies identified)**. A significant quantity of subsidies to transport could not be attributed to a single mode.

([16]) Revenue figures obtained from Eurostat (2006).

4 Transport subsidies in context

This study has identified annual European transport subsidies in the range of approximately EUR 270 to 290 billion. It is important, however, to put these subsidies into context with other closely related issues. This section briefly outlines a few key issues that should be kept in mind when looking at transport subsidies. On the one hand, there are some aspects directly related to subsidies, such as: the relation of subsidies to transport volumes of the various modes; the delineation of subsidies from expenditures for public service obligations (PSO) in public transit; and the role of environmentally beneficial subsidies. On the other hand, there are other economically highly relevant privileges for transport that define the competition of transport, both among modes and with non-transport activities. These are the existence of external costs of transport; the quality of transport infrastructure; and the benefits provided by regulation and land-use policy. All of these issue lie outside the core focus of this project. In the pursuit of fair, efficient and transparent competition, many issues must be considered in addition to the issue of transport subsidies.

4.1 Subsidies related aspects

4.1.1 Transport subsidies and modal share

As shown in this report, different transport modes receive varying amounts of subsidisation. The subsidy profile of each mode (e.g. incidences, what portion is on-budget or off-budget) also differs significantly from that of the other modes. However, for policy decisions regarding subsidies, it could also be relevant to consider the transport volumes (measured in tonne kilometre and in passenger kilometre) of each mode. Table 3 compares each mode's share of total passenger and freight transport volume to its share of the total subsidies found in this study. The percentage of subsidies going to roads is 43 % to 46 % of those found ([17]). However, the vast bulk of transport volume (82 % of passenger volumes and 46 % of freight volumes) is associated with road transport. In contrast, rail and air modes receive subsidy shares exceeding their share of transport volumes.

The policy conclusions to draw from the comparison in Table 3 are not obvious. If measured per passenger kilometre or per tonne kilometre (for freight), road receives a much lower level of subsidies than other modes. However, transport volumes should not guide decisions regarding whether and to what extent a particular transport activity should be promoted through subsidies. This should rather be based on social, environmental and economic criteria, where subsidies help to correct for market imperfections.

4.1.2 Public service obligations (PSO)

Public service obligations (PSO) are payments made to public transport companies to guarantee

Table 3 Comparison of modal shares of transport volume and subsidies

	Share of transport volume		Share of subsidies	
	Passenger	Freight	Low-end scenario	High-end scenario
Road	82 %	46 %	46 %	43 %
Rail	6 %	11 %	27 %	25 %
Air	12 %	0 %	10 %	12 %
Water	0 %	43 %	5 %	10 %
Multiple modes	n.a.	n.a.	11 %	10 %

Note: 2001 transport volume shares cover EU-25. Water includes domestic and intra-EU maritime shipping, but excludes transport between EU and non-EU countries. Data for road, rail and inland waterways are from Eurostat Structural Indicator data sets. Volumes for maritime shipping come from 'EU transport and energy in figures — statistical pocketbook 2004'; estimations for new Member States are based on reported energy consumption.

([17]) This share does not include subsidies to multiple modes, from which road transport also benefits.

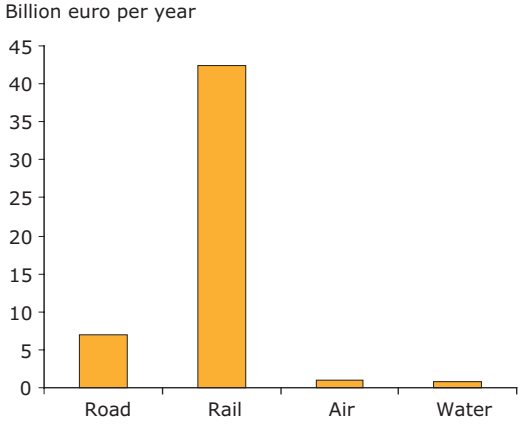
a sufficient quality of public transport services for example train services to remote regions or bus services at late hours. Without PSO these services are not profitable and would probably not be provided. Payments for PSO are supposed to provide a minimum quality of mobility and access without private cars, e.g. for under-aged, elderly, handicapped or people on low income. As such PSO could be considered a sort of 'social subsidy'. Usually local governments or communities order transport services for specific links of a certain quality and frequency, and the public transport company provides this service in return. Therefore, these payments do not fall under the definition of subsidies used in this study (see Section 2.1).

Figure 6 shows the value of PSO found in the course of this study. At just over EUR 40 billion per year, rail receives a much higher level of PSO than the other transport modes.

4.1.3 Environmentally beneficial subsidies

This study does not distinguish between subsidies considered environmentally beneficial and those considered environmentally harmful. Instead, the focus has been on quantifying transport subsidies in a systematic way to determine the overall level of transport subsidies in Europe. The environmental impacts of specific transport subsidies are, of course, important. This is true not only regarding whether a particular subsidy is considered environmentally harmful or beneficial, but also to what degree and in what particular ways it impacts the environment.

Figure 6 Value of PSO found, by mode (billion 2005 EUR)



Note: This graph is based on incomplete data; the total value of European transport PSO remains unknown. This note must accompany any use of this graph.

Many recent transport subsidies have been introduced with the aim of generating environmental benefits. Examples include: subsidies for vehicles utilising energy efficient and low-emission technologies; subsidies toward the purchase of alternative fuel vehicles; lower tax rates on biofuels; consumer rebates to encourage the retirement of older vehicles; and subsidies for public transport companies to encourage modal shift. Such subsidies that aim to be environmentally beneficial, though certainly relevant from an environmental policy point of view, were not the primary focus of this study.

4.2 Further determinants of the competition between transport modes

4.2.1 External costs of transport

External costs of transport have significant implications for the fairness of competition between transport modes. The fact that some transport activities do not cover all their costs by themselves is common for both externalities and subsidies. External costs are addressed by other ongoing work at the EEA (EEA, 2006). The monetary value of externalities has been evaluated by several studies (INFRAS/IWW, 2004; UNITE 2003); each of which shows that the economic relevance of externalities is significant. Some subsidies are introduced to correct for the fact that externalities are going unaddressed in some area of the transport system. Externalities have significant implications for the competition of transport with non-transport activities as well as for competition between modes.

Figure 7 shows the results of the most recent study on external costs of transport in the EU-15 plus Norway and Switzerland. It includes figures for the costs of climate change, air pollution, noise and accidents. The study by INFRAS and IWW identified a total of EUR 650 billion in external costs of transport for the year 2000. The study found that external costs related to road-based transport greatly exceed those of the other modes.

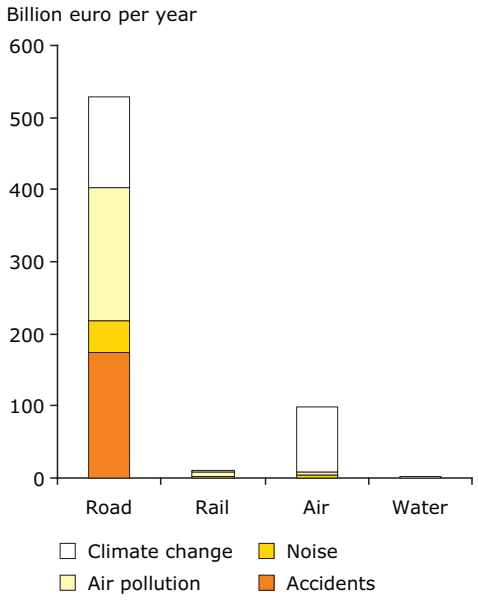
4.2.2 Quality of transport infrastructure

The availability, density and condition of the transport network have significant economic and environmental effects. Transport infrastructure shapes landscapes, urban patterns and settlement structures as well as determining the scope and structure of transport demand. A significant part of the infrastructure investments was made long ago and constitutes today's mobility patterns. It strongly

affects the transport intensity of the economy, the transport behaviour and the competition among modes. In the same way, today's infrastructure decision will influence tomorrow's mobility patterns. Although this study relies on past infrastructure costs to estimate annual infrastructure subsidies, the cumulative past subsidies to transport infrastructure are not fully included within the subsidy definition used in the study. Past infrastructure investments are instead regarded as 'sunk costs', i.e. their costs are independent of the infrastructure use. Of course, the annual public expenditure for the maintenance, improvement and enlargement of infrastructure would be included as transport subsidies in this study to the extent that these are not financed by infrastructure-related charges.

The common practice of joint financing infrastructure by different federal levels can distort a balanced decision of authorities. For example if a new local road is partially funded by federal government, this additional funding gives an incentive for local authorities to decide in favour of this road (even if its full costs exceed the benefits). The same applies to EU funding of infrastructure that might stimulate competition among Member States for infrastructure projects. The result is rather 'a political shopping list' (Rothengatter, 2006) and may further increase the tendency to overestimate the common benefits and to underestimate the overall costs. Possible results are inefficient infrastructure decisions.

Figure 7 Total external cost of transport EU-15 + Norway and Switzerland in 2000



Source: INFRAS/IWW (2004).

4.2.3 *Regulation and land-use policy*

Transport is an important object of state regulation via legislation, planning and administration. There are many legal and technical requirements for all kinds of transport products, services and activities. These requirements are important for the development and use of infrastructure, vehicles, energy, services. In addition, they have a major impact on the level and structure of transport. Technical and safety standards, for example, and their level of enforcement are much stricter for some modes (e.g. rail and aviation) than for others. This also has important effects on the quality and costs of transport services, transport demand and competition between modes ([18]). For example, the provision of international rail services faces major competitive drawbacks due to differing technical standards, safety and signal systems as well as licensing requirements for locomotive drivers. These differences hamper competition with road transport, particularly in the market for transporting freight transport, and also affect competition among rail carriers.

Furthermore, the regulation of market conditions is economically very important. Deregulation and liberalisation of transport markets were not introduced simultaneously for all modes. Transport markets were mostly deregulated and liberalised for road carriers and for airlines. As a consequence road carriers and private airlines reduced their tariffs significantly. This not only encouraged a shift from other modes, in particular rail to road freight and aviation, it also created new transport demands by increasing distances and frequency of transport. This development was further aggravated by the privatisation of rail companies who had to raise tariffs, among other factors, due to the introduction of cost accounting and — in some countries — to the introduction of infrastructure charges.

Another important, economically relevant, aspect is land-use planning, including urban and transport planning. These have a strong influence on the development of transport in the long run. Transport and land-use planning of previous decades shaped the existing urban structure and settlement patterns, and thus the transport needs of today. Planning and

([18]) See IWW, INFRAS: Facts on Competition in the European Transport Market (FACORA), final report, Zürich, Karlsruhe, 9. November 2004, p. 82 ff.

regulation also affect the attractiveness, average speed and competitiveness of transport modes rather directly. The most relevant example of policies encouraging private car use in cities is the allotment of attractive and easily accessible parking sites. Free or cheap parking and the right to park on the roadside or on public property is a very common way of attracting private car traffic, and is seen by some as a type of 'implicit' subsidy. Zoning and preferential access to some areas is another way of supporting specific modes and vehicles as are signal systems that give priority to public transport. However, such regulations and land-use policies are not included in the subsidy figures reported in this study.

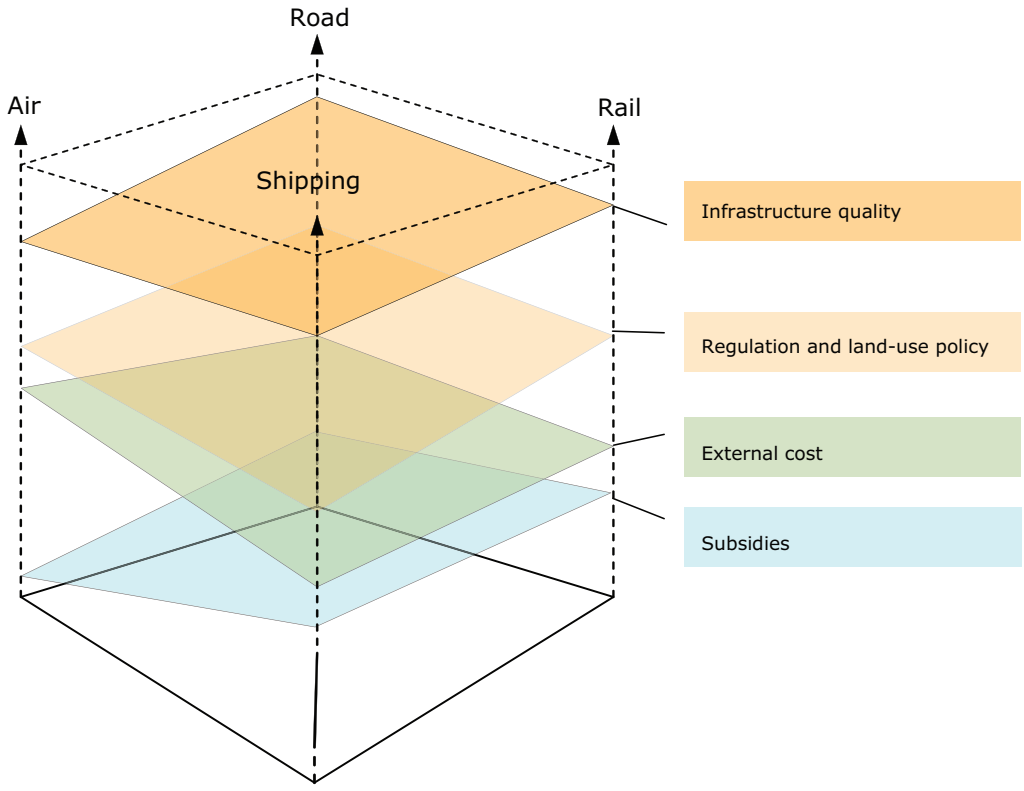
4.2.4 Transport subsidies and competition

It is outside the scope of this report to evaluate the absolute relevance of the various determinants for transport demand. However, it is important to elucidate that these economically relevant aspects of transport intensify the distortions of competitive conditions among transport modes. All four transport modes benefit not only from subsidies but also from externalities, regulation and land use as well as infrastructure quality. However, the level of these benefits is different for each mode.

Figure 8 conceptually illustrates how the competitive conditions among modes are shaped by the combined influences of subsidies and the further determinants described above. If we visualise the four transport modes as the four corners of a rectangle, we can imagine the supportive impact of subsidies as a rise in the competitive level for each mode. Since each mode is supported to differing degrees the result is an inclined plane. The same applies to the other determinants of competitive conditions. They support and provide benefits to all transport modes at a different range, and thus either intensify or level the distortions between the modes. Note that figure 8 is not based on real data and does not reflect the importance of these determinants correctly. It illustrates the concept rather than the dimension of competitive distortion.

Even though some efforts have been undertaken to quantify some of the aspects (in particular INFRAS/IWW 2004), the overall effect on competition has not yet been quantified. However, several studies show that the economic relevance of externalities probably exceeds the effect of subsidies for road and air. It is up to other research activities to evaluate the economic importance of each determinant on the one hand and its combination on the other.

Figure 8 Determinants of competition between transport modes



5 Assessment of the data quality

All data gathered in this project was put into a database on transport subsidies. Access to it can be provided by the EEA on request. In this section, we describe the way the data presented in Chapter 4 were gathered and processed. Furthermore, we assess the quality of the data regarding its availability, completeness and reliability. This assessment includes a discussion of some biases in the data and a description of the way double counting was prevented.

5.1 The data gathering process

As explained in Chapter 3, different types of subsidies are distinguished in this report: on-budget subsidies to users, services or vehicle producers, infrastructure costs and charges, fuel excise taxes, and VAT on passenger services. In this section, we describe separately the processes of data gathering and processing for all these types of subsidies. In addition, we briefly discuss the way the data about external costs of transport were gathered and processed.

5.1.1 On-budget subsidies

The data gathering process for on-budget subsidies consisted of three steps:

- Analysis of literature
- Interviews with main international experts
- Data search with national contact points

Most of the data was gathered in the first step. In this step, a number of literature sources were investigated. These were mostly selected from a literature database generated in the previous project on transport subsidies by Ecologic and TU Dresden (Ecologic, 2005). Simultaneously with this literature review, interviews were conducted with 10 international experts in the field of transport subsidies (see Annex 2). These interviews provided some additional literature sources. Finally, additional literature sources were gathered by contacting some national representatives.

In total, about 60 literature sources were searched for subsidy data (a list of these sources is given in Annex 2); 15 of them contain data about on-budget subsidy levels. In Table 4 an overview of these sources is given, which also indicates for which modes and incidences these sources provide data. The allocation of the data to modes and incidences is mainly based on the definitions of the subsidies as defined in the relevant literature sources, which may be more limited than the definition used in this report. However, an assumption had to be made with regard to the data related to public transport. These data were assigned to 'road', unless they refer explicitly to public transport by rail (metro, tram), in which case they were assigned to 'rail'. In addition, it was not clear to which transport mode some data were related. In these cases, the data were assigned to the transport mode 'other' or 'general'.

First, some data were presented as an aggregate amount over multiple years. For example, Madarassy *et al.* (2004) present the support of the EU to ISPA projects in Eastern European countries as the aggregate amount the countries received for the period 2000–2002. These subsidy levels were allocated to a single year by assuming an average yearly amount for the median year (e.g. 2001 in the example above).

Secondly, it was indicated whether the data refer to a PSO or not. Subsidies were considered to be a PSO wherever this was explicitly stated in the reports from which the data were obtained. This method is likely to underestimate the actual value of PSOs.

5.1.2 Infrastructure costs and charges

Section 4 presents infrastructure costs and charges in the EU-15. These figures were all extracted from the UNITE studies (Link *et al.*, 2002; 2003) and are adapted for this project. Similar to other on-budget subsidies, the figures were standardised into 2005 prices using OECD consumer price indices. Furthermore, to allocate the costs and charges to the various transport modes, the same assumptions were used as in the case of the allocation of on-budget subsidies to transport modes.

5.1.3 Differences in fuel excise taxes

The total fuel excise duties per mode have been calculated on the basis of the energy consumption of the various modes and the actual fuel excise

duties (both from the most recent EEA TERM fact sheets). For aviation and waterborne modes, no fuel excise duties exist at the moment. For rail diesel, there are fuel excise duties, but there is no consistent overview of these values in the various Member States. For countries where no data on fuel excise duties were found, fuel excise duty for rail diesel was assumed to be zero. This means that the estimates for the rail fuel subsidies represent an upper limit. Data on fuel subsidies do not cover the electric portion of rail transport where electricity charges may sometimes also be lower than the regular rates.

5.1.4 VAT on passenger services

To compute these differences, we gathered data about standard VAT rates and VAT rates for domestic and international passenger transport services from the European Commission (2006). By multiplying these differences by the receipts for the various modes, we estimated the total size of VAT reductions for passenger transport services. The receipt figures come from Eurostat (2006), and we have standardised them to 2005 price levels. However, these figures are related to both passenger and freight transport (except for 'road', for which separate figures for passenger transport turnovers are available). Additionally, no distinction between domestic and international transport was made. Therefore, we used expert estimates on both the share of passenger transport in total transport receipts and the share of domestic transport in total transport receipts (see Table 5).

5.2 Cleaning the data

The data gathered in the process described above contained double counting. In addition, monetary values were not corrected for inflation. Adjustments had to be made to the data before they could be combined into an estimated annual figure.

Table 4 Overview of key literature sources used

	Road	Rail	Shipping	Aviation
Means of transport	European Commission (2006) Eurostat (2006)	Eurostat (2006)	European Commission (2006) Eurostat (2006) OECD (2005)	Eurostat (2006)
Transport users	BMF (2006) Foltynova (2006) Link *et al.* (2002) Link *et al.* (2003a,b) Nash *et al.* (2002)* Steininger (2005)	Foltynova (2006) Link *et al.* (2002) Link *et al.* (2003a,b) Nash *et al.* (2002)*	Link *et al.* (2003a,b)	Link *et al.* (2003a,b)
Transport services	BMF (2006) CE (2004) Link *et al.* (2003a,b) Nash *et al.* (2002)*	CE (2004) Link *et al.* (2002) Link *et al.* (2003a,b) Nash *et al.* (2002)* NERA (2004) Schreyer *et al.* (2004)	BMF (2006) Link *et al.* (2003a,b)	European Commission (2001) Link *et al.* (2002) Link *et al.* (2003a,b) Nash *et al.* (2002)*
Other	Link *et al.* (2003a,b) Steiniger (2005)	Link *et al.* (2002) Link *et al.* (2003a,b) NERA (2004) Schreyer *et al.* (2004)	Link *et al.* (2002)	DIW (2003) Link *et al.* (2002) Link *et al.* (2003a,b) Nash *et al.* (2002)
General	Link *et al.* (2003a,b) Stuz (2003) Volterra Consulting (2003)	Link *et al.* (2003a,b) Stuz (2003) Volterra Consulting (2003)	Link *et al.* (2003a,b)	Volterra Consulting (2003)

* Nash *et al.* (2002) does contain data about transport subsidies. However, these data are not used in this project because exactly the same data is presented by Link *et al.* (2002; 2003).

5.2.1 *Preventing double counting*

The method of data gathering used in this project could possibly lead to the double counting of data. Three (potential) kinds of double counting were addressed in this project:

- Data for exactly the same subsidy from different sources. For example, Nash *et al.* (2002) and Link *et al.* (2003a,b) both present the same figures with respect to rail subsidies provided by national governments for concessionary fares. To prevent double counting, data were removed from the database so that only data from one source are included.

- Data for the same form of subsidies from different sources. Although these data are related to the same form of subsidies, it is not clear whether they refer to exactly the same subsidies. For example, the European Commission (2001) presents data about operating aid granted to shipbuilding. On the other hand, Eurostat (2006) data about support for research and development in the transport sector also contain expenditure for ship-building and maintenance. It is obvious that both types of subsidies are related. However, the two sources do not present the same figures for the various countries. Without an in-depth analysis, it therefore remains unclear whether the figures presented by both sources refer to the same subsidies. To prevent possible double counting, the analysis only included the data from the source which provides the largest or most complete values for a particular subsidy. A drawback of this prevention method for double counting is that the aggregate values for transport subsidies in European countries, as presented in Section 4, could provide an underestimation of actual values.

- Data for the same type of subsidy for different years from the same source. For example, Link *et al.* (2002; 2003) contains for most types of subsidies and countries figures for 1996, 1998 and 2005. To prevent double counting, we only used the most recent real figures in the analyses. Any estimation of subsidy levels (like the estimated figures for 2005 in Link *et al.* (2002; 2003)) is not included in the analysis.

5.2.2 *Adjusting for inflation*

The data presented in the various sources are related to different years. It was therefore necessary to control for inflation. Using consumer price indices per country from the OECD (2006), all subsidy levels were standardised to 2005 price levels. However, OECD (2006) did not contain price indices for Bulgaria, Estonia, Latvia, Lithuania and Slovenia. For these countries, an assumed price index was used, which is equal to the average price index of the following four countries: Czech Republic, Hungary, Poland and Slovakia.

5.3 *Data quality*

In this section we assess the quality of the data used in this project. The first topic addressed is related to the completeness of the data. Which data gaps can be identified? Secondly, some potential biases in the data are discussed.

Table 5 Expert guesses on the share of both passenger transport and domestic transport in total transport services receipts

	Road — passenger	Rail	Aviation	Inland shipping	Maritime shipping
Distribution of transport receipts over passenger and freight transport					
Share of passenger transport	100 % ([19])	30 %	90 %	1 %	1 %
Share of freight transport	0 %	70 %	10 %	99 %	99 %
Distribution of total transport receipts over domestic and international transport					
Share of domestic transport	90 %	90 %	5 %	90 %	50 %
Share of international transport	10 %	10 %	95 %	10 %	50 %

Note: Percentage shares estimated by CE Delft.

([19]) For road there are separate turn-over data available for passenger transport services.

5.3.1 Data gaps

Although this project covers a large part of transport subsidies in Europe, the quality of the data varies and some data gaps remain. Some potential data gaps include:

- Subsidies for the production of trains and aircraft are only covered by Eurostat (2006). However, this source only provides data related to research and development subsidies. Although it is not clear whether other subsidies for these industries exist, this seems quite likely. For example, some car manufacturers or ship-builders and their suppliers may benefit from other subsidies, such as business grants and corporate tax exemptions.

- With the exception of data on bus users, data on subsidies for users of motor vehicles (e.g. tax deductible amounts for vehicles) are only available for some countries. However, there is reason to believe that these kinds of subsidies exist in most European countries.

- With the exception of public transport services, no data on subsidies for road transport services are available. This concerns subsidies for car rental, car maintenance and for hauliers and carriers.

- Due to incomplete data sets in UNITE (Link *et al.*, 2002; 2003) the total value of infrastructure costs and charges of aviation and shipping used in this project is probably too low.

- Data with respect to fuel excise duties for rail are incomplete. There are data for only three countries on rail diesel excise duties. For the other countries, a current fuel excise duty for rail diesel of zero is assumed, making the subsequent subsidy estimate an upper limit. In addition, data on fuel subsidies do not cover the electric part of rail transport, where electricity may sometimes also be taxed lower than the regular rates.

- Data on subsidies related to biofuels are only available in this project for two countries: Germany and the Czech Republic.

It is important to note that not finding data on subsidies for certain modes or incidences does not necessarily mean a data gap. It is also possible that this kind of subsidy does not exist at all.

5.3.2 Biases in the data

The data about transport subsidy levels possibly contain some biases:

- Some literature sources provide relatively old data. It could be the case that this kind of subsidy no longer exists or has been replaced by another kind of subsidy, for which data were also found in the database. By using these data in the analyses, the values of some transport subsidies are possibly overestimated. Without further research it is not possible to correct for this potential overestimation. However, we expect that these biases in the data will only have a small effect on the results.

- Fuel subsidies are estimated by calculating the difference between actual fuel excise duties and hypothetical fuel excise duties. For the latter, the following two references are used: average CO_2 price in EU ETS, and minimal road diesel excise duties according to the Fuel Directive. The results for the fuel subsidies are heavily dependent on the hypothetical fuel excise duty used. For example, the fuel subsidy for shipping in the EU-25 is EUR 3.0 billion per year (if the average CO_2 price in ETS is used as a reference), while the fuel subsidy equals EUR 19 billion per year (if the minimal road diesel excise duty of the Fuel Directive is used as a hypothetical fuel excise duty).

6 Conclusions

This report summarises and structures data on transport-related subsidies available from existing studies and literature. It only focuses on fiscal subsidies with direct relevance to public budgets and with no direct service in return. This includes subsidies for infrastructure, other on-budget subsidies, exemptions and rebates from fuel excise taxes, and VAT exemptions and rebates on passenger services. Data on other economically relevant distortions of competition between transport modes, such as the existence of externalities or uneven regulation, are not included. The figures presented are not gathered directly from national accounts or detailed country reviews. Given that the data collection was not exhaustive for all subsidies in all Member States, the aggregate numbers presented in this report should be considered as a lower boundary for the overall level of European transport subsidies.

Transport subsidies are a major aspect of fostering transport

Transport subsidies are significant. This report identifies European transport subsidies worth at least EUR 270 to 290 billion annually. Although not all transport subsidies can be labelled as environmentally harmful, some of them are. The distribution of subsidies among modes does not reflect their environmental performance. Road transport, which is the most important contributor to environmental problems within all transport modes, receives EUR 125 billion in annual subsidies. Note: this is the highest level of subsidisation found in the study. Most of them come from infrastructure subsidies, if one assumes that taxes related to road transport are regarded as contributions to general public budgets. Aviation - the mode with the highest specific climate impact - enjoys significant subsidies in the form of preferential tax treatment, in particular exemptions and rebates from fuel tax and VAT. These exemptions add up to EUR 27 to 35 billion per year. Rail is subsidised with EUR 73 billion per year (not including payments for PSO) and benefits the most from other on-budget subsidies. Some stakeholders justify some parts of these subsidies on environmental grounds as a means of fostering a modal shift from less environmentally friendly modes, in particular from road and to some extent from aviation. For water-borne transport, EUR 14 to 30 billion in subsidies have been identified.

Different modes benefit from different types of subsidies

It is notable that different types of subsidies are predominant for different modes of transport. For three of the four transport modes, there is one subsidy type that dominates all others: infrastructure subsidies for road transport, VAT exemptions for aviation, and fuel tax exemption for shipping. In each of these cases, one subsidy type accounts for more than all other subsidies combined. By contrast, while fuel subsidies are dominant in shipping, they do not play a major role for road and rail transport, and are only of some relevance for aviation. Reduced VAT, which is the dominant subsidy in aviation, is only somewhat relevant for roads, and marginally relevant for rail and shipping. On-budget subsidies are highly relevant for rail, but are only a very small portion of aviation subsidies.

Environmental concerns are seldom the rationale for subsidies

Regarding the objectives for the transport subsidies found, environmental objectives are not a significant motivation for the bulk of subsidies (with the exception of subsidies to rail transport). For many subsidies, policymakers regard their environmental drawbacks as less important compared to possible economic or social benefits. Rail subsidies are sometimes justified on the basis of the better environmental performance of rail compared with the competing modes of road and air. However, not all subsidies for rail transport can be assumed to be environmentally beneficial.

Hardly any transport subsidies found internalise external benefits, simply because positive externalities of transport are (apart from some aspects of infrastructure) negligible. As a second-best solution, subsidies could be justified to balance the existence of external costs of competing modes, e.g. when an internalisation of the externality, for whatever reason, encounters strong political opposition from vested interests. This applies to some of the subsidies for public transport, especially rail, since its competing modes, particularly road and air, have significantly higher external costs.

Transport subsidies are only one of many aspects affecting competition

Transport enjoys several privileges compared to other sectors. Next to the fact that transport is subsidised, there are several economically relevant aspects that foster transport. Transport causes significant external costs that were estimated at up to EUR 650 billion per year; this means that many transport activities do not pay their full costs. Furthermore, transport depends on a historical network of infrastructure, which — though not considered a subsidy in the present — was predominantly financed by public budgets in the past. This still shapes present transport patterns. Finally, transport is favoured by privileged regulation and land-use policy by, among other factors, the allotment of attractive and easily accessible parking sites in cities, and the deregulation and liberalisation of transport markets. Road freight transport and aviation benefit most by different regulatory conditions.

All of these aspects contribute to the attractiveness of transport in social and economic terms and are a key reason for the current level and structure of transport needs. The relevance of each of these privileges varies between modes and is difficult to quantify in economic terms. An assessment of these issues lies outside the scope of this study.

The data found represent a conservative estimate

The numbers given in this study have been derived mainly from literature and expert consultations. They represent a conservative, albeit indicative estimate as not all types of subsidies in all Member States are covered. A detailed analysis of financial budgets of EU and Member States might provide higher figures.

Also, the availability of data on subsidies in some countries was better than in others. This was simply due to more transparent information. Nevertheless, a lack or incompleteness of data does not necessarily indicate an absence of subsidies, but could possibly stem from a lack of interest or knowledge about subsidies. Estimations were conducted on the basis of different base years and time periods. Therefore, the annual data found also reflect the data availability.

The actual figures on the total value of European transport subsidies still remains unknown. The effort to collect all relevant data goes far beyond the scope of this report. A complete evaluation of all transport subsidies in the EU would require an analysis of all public budgets of the EU, Member States and municipalities as well as estimations of off-budget subsidies from well-based reference levels. However, even less ambitious future work on transport subsidies may improve data quality and allow a much better picture of the size, structure and distribution of transport subsidies in Europe.

7 References

BMF (2006). *Bericht der Bundesregierung über die Entwicklung der Finanzhilfen des Bundes und der Steuervergünstigungen für die Jahre 2003 bis 2006* (20. Subventionsbericht), http://www.bundesfinanzministerium.de/lang_de/DE/Service/Downloads/Abt__I/0603151a1002,templateId=raw,property=publicationFile.pdf.

CE (2004). *The Price of transport — Overview of the social costs of transport*.

Clean Air Action Group (2004). *Environmentally Harmful Subsidies in the Hungarian Economy*, Edited by Kaloy Kiss, Levegó Munkacsoport, Lélegzet Alapítvány, Budapest.

DIW (2003). *Financial Support to the Aviation Sector*, http://www.umweltbundesamt.de.

ECMT (2004). Road Haulage Taxation Database, http://www.cemt.org/topics/taxes/AnnexB3e.xls.

Ecologic (2005). *The Use of Subsidies, Taxes and Charges in the EU Transport Sectors*. Report for the European Environment Agency.

European Commission (2001). *Ninth Survey on State Aid in the European Union*, http://ec.europa.eu/comm/competition/state_aid/others/.

Eurostat (2006). Data tables from Eurostat website, http://epp.eurostat.ec.europa.eu.

Foltýnová (2006). *Promotion of the Biofuels Utilization in the Czech Republic by Using Economic Tools*.

INFRAS/IWW (2004). *External costs of transport, update study by INFRAS and IWW*, final report, Zurich, Karlsruhe, October 2004, http://www.uic.asso.fr/html/environnement/cd_external/docs/externalcosts_en.pdf.

International Centre for Integrative Studies (2005). Tax Flight, http://www.student.unimaas.nl/d.meijers/uni/taxflight.pdf.

Krawaczyk *et al.* (2003). *Financing Transport Infrastructure in Poland — past experiences and future plans*, http://www.cemt.org/online/infrastr03/krawczyke.pdf.

Link *et al.* (2002). *UNITE — Deliverable 5: Pilot Accounts — Results for Germany and Switzerland*, http://www.its.leeds.ac.uk/projects/unite/deliverables.html.

Link *et al.* (2003a). *UNITE — Deliverable 8: Pilot Accounts — Results for Austria, Denmark, Spain, France, Ireland, Netherlands and UK*, http://www.its.leeds.ac.uk/projects/unite/deliverables.html.

Link *et al.* (2003b). *UNITE — Deliverable 12: Pilot Accounts — Results for Belgium, Finland, Greece, Hungary, Italy, Luxembourg, Portugal, Sweden*, http://www.its.leeds.ac.uk/projects/unite/deliverables.html.

Madarassy *et al.* (2004). Heading down dead ends, http://www.bankwatch.org/documents/dead_ends_transport_study_09_04.pdf.

Nash *et al.* (2002). *The environmental impact of transport subsidies*, http://www1.oecd.org/agr/ehsw/SG-SD-RD(2002)1r1.pdf.

NERA (2004). *Study of the financing of and public budget contributions to railways*, http://www.nera.com/image/Study_Financing_Public_Budget_Contributions_Railways.pdf.

OECD (2005). *Environmentally Harmful Subsidies, Challenges for reform*, http://www.oecd.org/document/54/0,2340,en_2649_37465_35266678_1_1_1_37465,00.html.

Planco (2003). *TEN-Invest*, Final report, http://ec.europa.eu/ten/transport/documentation/doc/2003_ten_invest_en.pdf.

Prettenthaler *et al.* (2004). *Environmentally Counterproductive Support Measures im Bereich Verkehr*, in: KÖPPL, A. and STEININGER, K. (eds.). Reform umweltkontraproduktiver Förderungen in Österreich, Schriftenreihe des Instituts für Technologie und Regionalpolitik der Joanneum Research, Graz: Leykam.

Rothengatter (2006). International Transport Infrastructure Trends and Plans, Presentation on the 17th International ECMT/OECD Symposium on Transport Economics and Policy, 25–27 October 2006 in Berlin.

Schreyer *et al.* (2004). *Facts on Competition in the European Transport market (Facora)*, http://www.uic.asso.fr/etf/.

Steininger (2005). *Reforming environmentally harmful subsidies in the transport sector in Austria*.

Stuz (2003). *Alternative State Budget of the Czech Republic for the year 2004, with a perspective until 2013*.

UBA (2005). Umweltbundesamt; Determinants of Transport Growth, UBA-Texte 35/05, Dessau, December.

UNITE (2003). *Unification of accounts and marginal costs for transport efficiency*; final report for publication, Leeds, November 2003.

Volterra Consulting (2003). Fiscal Treatment of Public Transport, http://www.volterra.co.uk/Docs/fiscal_pt.pdf.

Annex 1 List of sources consulted

The following table lists the literature sources consulted in the effort to obtain data on European transport subsidies. Of these, 15 sources (see Table 4 in the main report) provided data on subsidies.

Table A2-1 Literature sources consulted in this study

Author	Year	Title
NERA	2004	Study of the financing of and public budget contributions to railways
OECD	2005	Environmentally Harmful Subsidies, Challenges for reform
Madarassy *et al.*	2004	Heading down dead ends
Nash *et al.*	2002	The environmental impact of transport subsidies
Volterra Consulting	2003	Fiscal Treatment of Public Transport
DIW	2003	Financial Support to the Aviation Sector
CE	2004	The Price of transport — Overview of the social costs of transport
CE	2003	Environmentally harmful support measures in EU Member States
Krawaczyk *et al.*	2003	Financing Transport Infrastructure in Poland — past experiences and future plans
European Commission	2001	Ninth Survey on State Aid in the European Union
ECMT	2004	Road Haulage Taxation Database
OECD	2003	Environmentally Harmful Subsidies, Policy Issues and Challenges
Baumgartner	2001	Prices and Costs in the railway sector
Eurostat	2004	Panorama of transport, Statistical overview of transport in the European Union, Part 2
Pietrantonio, L. di, Pelkman, J.	2004	The Economics of EU Railway Reform
Zivec, B.	2003	Financing of Transport Infrastructure in Slovenia
NERA	2004	Evaluation of the Feasibility of Alternative Market-Based Mechanisms to promote low-emission shipping in European Union Sea Areas
Adler *et al.*	2002	Marginal cost pricing implementation paths to setting rail air and water transport charges
Perkins, S.	2004	Charging for the use of roads: policies and recent initiatives
UITP	2005	Mobility in cities
International Center for Integrated Studies (ICIS)	2005	Tax Flights — An Investigation into the Origin and the Development of the Exemption from various kinds of Taxation of International Aviation
European Environment Agency	2004	Energy subsidies in the European Union
Holland, M., Watkiss, P.	2002	Benefits Table database: Estimates of the marginal external costs of air pollution in Europe, BeTa Version E1.02a
EEA	2000	Environmental taxes: recent developments in tools for integration
Link *et al.*	2002	UNITE D5 (UNIfication of accounts and marginal costs for Transport Efficiency). Pilot Accounts-Results for Germany and Switzerland
Nijkamp, P., Ubbels, B.,Verhoef, E.	2002	Transport Investment Appraisal and the Environment
Gleister, S., Graham, D.	2003	Transport Pricing: Better for Travellers
Perkins	2005	Tax Incentives for fuel efficient Cars is Climate Change Priority
Ecotec et. al.	2001	Study on the Economic and Environmental Implications of the Use of Environmental Taxes and Charges in the European Union and its Member States. Final Report
Link *et al.*	2003	UNITE D12 (UNIfication of accounts and marginal costs for Transport Efficiency). Pilot Accounts — Results for Belgium, Finland, Greece, Hungary, Italy, Luxembourg, Portugal, Sweden
Macário *et al.*	2003	UNITE D6 (UNIfication of accounts and marginal costs for Transport Efficiency). Supplier Operating Costs Case Studies

Table A2-1 Literature sources consulted in this study cont.

Author	Year	Title
Doll *et al.*	2002	UNITE D7 (UNIfication of accounts and marginal costs for Transport Efficiency). Transport User Cost and Benefit Case Studies
Maibach *et al.*	2003	UNITE D16 (UNIfication of accounts and marginal costs for Transport Efficiency). Policy perspectives
T.I.S.	2002	Study on vehicle taxation in the Member States of the European Union
INFRAS	2000	Variabilisation and Differentiation Strategies in Road Taxation
Perkins, S.	2003	Reforming Transport Taxes and Charges
Environmental Assessment Institute	2005	Environmentally Harmful Subsidies — Linkages between subsidies, the environment and the economy
Ecotec et. al.	2001	Study on the Economic and Environmental Implications of the Use of Environmental Taxes and Charges in the European Union and its Member States. Final Report
Krauth, V.	2005	Hidden subsidies for urban car transportation
Friederiszick *et al.*	2003	Evaluation of the effectiveness of state aid as a policy instrument: the railway sector
Link *et al.*	2002	UNITE D14 Future approaches to accounts
Link *et al.*	2003	UNITE D8 (UNIfication of accounts and marginal costs for Transport Efficiency). Pilot Accounts- Results for Austria, Denmark, Spain, France, Ireland, Netherlands and UK
Schreyer *et al.*	2004	Facts on Competition in the European Transport market (Facora)
Planco	2003	TEN Invest
Eurostat	2006	New Cronos database
Speck, S., McNicholas, J., Markovic, M.	2001	Environmental Taxes in an Enlarged Europe — An Analysis and Database of Environmental Taxes and Charges in Central and Eastern Europe
Nash *et al.*	2003	UNITE — Final Report for Publication
BMF (Bundesministerium für Finanzen)	2006	Bericht der Bundesregierung über die Entwicklung der Finanzhilfen des Bundes und der Steuervergünstigungen für die Jahre 2003 bis 2006 (20. Subventionsbericht)
Steiniger & Prettenthaler	2005	Reforming environmentally harmful subsidies in the transport sector in Austria. Summary
Foltýnová & Máca	2006	Promotion of the Biofuels Utilization in the Czech Republic by Using Economic Tools
STUZ (Society for Sustainable Living)	2003	Charles University Environment Centre in Prague: Alternative State Budget of the Czech Republic for the year 2004, with a perspective until 2013.
Statistiches Bundesamt Deutschland	2005	Finanzen und Steuern: Jährliche Einkommensteuerstatistik auf Basis der Geschäftsstatistik der Finanzverwaltung Sonderthema: Analyse der Entfernungspauschale.
Knight *et al.*	2000	Fair and Efficient Pricing in Transport — The Role of Taxes and Charges. Study commissioned by DG TREN, EC DG TAXUD and EC DG ENV. April.
Sjoelin	2000	Environmental taxes and environmentally harmful subsidies. Statistics Sweden report prepared for DG Environment and EUROSTAT.
Köppl	2004	Reform umweltkontraproduktiver Förderungen in Österreich
Riedinger	2006	French Environment Ministry. Personal communication.
EEA	2006	TERM factsheet 1 Transport energy consumption
EEA	2006	TERM factsheet 21 Fuel prices
Schreyer *et al.*	2004	External costs of transport
European Commission	2006	VAT rates applied in the Member States of European Community

Key experts consulted

Experts in the field of transport, environment, fiscal science and statistics were consulted regarding information on transport subsidies. In addition, some experts participated in expert workshops held by the EEA in March and September 2006. The following table lists the key experts consulted.

Table A2-2 List of experts consulted regarding European transport subsidies

Last	First	Institution
Barbosa	Pedro	European Commission, DG Environment
Delsalle	Jacques	European Commission, DG Environment
De Ridder	Wouter	Environmental Assessment Agency (MNP)
Doll	Claus	Fraunhofer Institut für System- und Innovationsforschung (ISI)
Erba	Stefano	Milano Politecnico
Fernandez Balbin	Matilde	Ministry of Public Works and Transport
Fergusson	Malcolm	Institute for European Environmental Policy
Friedrich	Axel	Umweltbundesamt
Gleissenberger	Eva	Federal Ministry for Agriculture, Forestry, Environment
Kjellingbro	Peter Marcus	Environmental Assessment Institute
Kleinegris	Winfried	DG Energy and Transport (DG TREN)
Kövesti	Istvan	Institute for Transport Sciences
Laaser	Claus-Friedrich	Institut für Weltwirtschaft Forschungsgruppe 'Verkehrswirtschaft'
Liechti	Markus	European Federation for Transport and Environment (T&E)
Link	Heike	DIW Berlin
Lukács	András	Clean Air Action Group (CAAG)
Madarassy	Judit	CEE Bankwatch
Markandya	Anil	FEEM, Italy
Mederer	Wolfgang	DG Competition
Nägele	Andreas	DG Transport
Nash	Chris A.	Institute for Transport subsidies, University of Leeds
Oosterhuis	Frans	Institute for Environmental Studies (IVM)
Perkins	Stephen	OECD
Ponti	Marco	Milano Politechnico
Rietveld	Piet	VU Amsterdam, Department of Spatial Economics
Rosenstock	Manfred	DG Environment
Rothengatter	Werner	Universität Karlsruhe, Institut für Wirtschaftspolitik und Wirtschaftsforschung
Schlegelmilch	Kai	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
Schreyer	Christoph	INFRAS
Steenblik	Ronald	Global Subsidies Initiative International Institute for Sustainable Development
Steinbach	Nancy	Eurostat
Steininger	Karl W.	University Graz
Sutter	Daniel	INFRAS
Walter	Felix	ECOPLAN

Annex 2 Brief guide to the data sources for European transport subsidies

This annex shows the data sources used, ranked by their contribution of total value of subsidies found. It thus shows which sources were the most important for this study. The text lists each key study, the total value of subsidies it contributed to the estimate of annual transport subsidies, and describes each study in more detail.

International Centre for Integrative Studies (2005). This study was the source for four data items with a total value of EUR 68 891 million. The data are from 2002 and cover financial support for airlines in the EU-15. This paper discusses the origins and development of the exemption of aviation from taxes and charges for the United States and Europe with a special focus on the Netherlands.

NERA (2004). This study was the source for 50 data items with a total value of EUR 53 645 million. The data are from 2001 and cover rail transport for EU-15 plus Norway and Switzerland. The study focuses on assessing the public budget contributions of the financing of railway undertakings and rail infrastructure managers, as well as on reviewing their financial position. It contains a large amount of data and gives a comprehensive overview of the situation in the European railway sector.

European Commission (2001). This study was the source for 62 data items with a total value of EUR 26 029 million. The data span the years 1995 to 1999 and cover the modes road, rail, shipping as well as combined transport for EU-15. This is the official report of the European Commission on state aid that is published regularly. It covers all sectors of society.

Link *et al.* (2003a). This study was the source for 23 data items with a total value of EUR 16 177 million. The data span the years 1996 to 1998 and cover all modes of transport. This study is part of the project UNITE (UNIfication of accounts and marginal costs for Transport Efficiency) that was funded by the European Commission within the EU 5th framework research programme. In this deliverable, the methodology and pilot accounts for Belgium, Finland, Greece, Hungary, Italy, Luxembourg, Portugal and Sweden are presented.

Schreyer *et al.* (2004). This study was the source for 12 data items with a total value of EUR 10 995 million. The data is from 2000 and cover all modes of transport. Typically referred to as the FACORA study, this study provides a comprehensive and methodologically sound analysis of market distortions in the transport sector. Spatially it covers EU-15 plus Norway and Switzerland for all modes of transport. As it was carried out for the UIC there is a focus on gathering data that is relevant for policy activities of stakeholders in the railway sector. The following distortions are included: level of external costs, differences in taxation (VAT, fuel and vehicle taxes) and in pricing schemes, infrastructure investments, public sector contributions (e.g. for public transport and aviation as well as safety and social regulations). The data used is of high quality. Deficiencies in data quality and quantity are found only regarding public sector contributions.

Link *et al.* (2002). This study was the source for six data items with a total value of EUR 10 867. The data span the years 1996 to 1998 and cover all modes of transport. This study is one part of the project UNITE (UNIfication of accounts and marginal costs for Transport Efficiency) that was funded by the European Commission within the 5th Framework. In this deliverable, the methodology and pilot accounts for Germany are presented.

Link (2003b). This study was the source for 31 data items with a total value of EUR 6 385 million. The data span the years 1996 to 1998 and cover all modes of transport. This study is one part of the project UNITE (UNIfication of accounts and marginal costs for Transport Efficiency) that was funded by the European Commission within the 5th Framework. In this deliverable, the methodology and pilot accounts for Austria, Spain, France, the United Kingdom, the Netherlands, Ireland, Spain and Denmark are presented.

Madarassy *et al.* (2004). This study was the source for 34 data items with a total value of EUR 3 562 million. The data are from 2001 and cover all modes of transport for CEE-10. This study was produced by the CEE Bankwatch Network in order to analyse the investments of multilateral institutions in transport sector infrastructure in the Central and Eastern European (CEE) region. Recommendations are given for positive change in CEE transport sector financing.

DIW (2003). This study was the source for eight data items with a total value of EUR 3 173 million. The data span the year 1998 and cover air transport. The aim of this study is to give an overview of the overall dimension of (on-budget and off-budget) aviation subsidies. Various definitions of subsidies are discussed ending with a definition for the work in the study. Based on this, a methodological framework for empirical analysis of financial support to the aviation sector is developed. This framework is applied to several case studies for the financial support of the aviation sector in Germany, France and the Netherlands.

BMF (2006). This report was the source for 13 data items with a total value of EUR 2 070 million. The data are from 2006 and cover the following modes: rail transport road, rail combined and shipping for Germany. The report is the official report of the German government about financial aid and tax relief measures, which is published regularly and covers all sectors of society. In the report, a rather narrow definition for the term of subsidy is used. One reason for this is the intention to avoid overlapping with other official reports.

Planco (2003). This study was the source for 130 data items with a total value of EUR 1 826 million. The data span the years 1991 to 1999 and cover all modes of transport for the EU-25. This study aims at providing the Commission with detailed technical information on the status of the TEN-T network, including investments that have been made and are foreseen until 2010 and an outlook ahead to the year 2015. It is a comprehensive data collection on current and future transport Infrastructure costs and investments, including an inventory of the technical Status of the trans-European transport network.

Eurostat (2006). This Excel sheet was the source for 21 data items with a total value of EUR 828 million. The data span the years 1999 to 2004 and cover the modes road, rail, shipping and air transport for Austria, Czech Republic, Estonia, Germany, Greece, Hungary, Poland, Portugal, Romania, Slovenia, Spain and Sweden This source contains data tables from the Eurostat website that are published regularly.

CE (2004). This study was the source for four data items with a total value of EUR 441 million. The data is from 2002 and cover the following modes: road and rail for the Netherlands.

OECD (2005). This study was the source for three data items with a total value of EUR 185 million. The data span the years 1998 to 2000. Subsidies for shipbuilding are included for Norway, Poland and Slovakia. The study is divided into three sections: definition and measurement of subsidies, developing a checklist for environmentally harmful subsidies, and political economy of environmentally harmful subsidies. It covers all sectors of society.

Krawaczyk *et al.* (2003). This study was the source for one data item with a total value of EUR 184 million for EU grants for transport infrastructure modernisation. The data span the year 1998 and cover all modes of transport. The study gives an overview about the current situation in Poland concerning infrastructure policy and financing.

Foltýnová and Máca (2006). This study was the source for four data items with a total value of EUR 78 million. The data span the years 2001 and 2003 and cover the modes road and rail. This paper focuses on analysis of financial measures on promotion of biofuels production and consumption in the Czech Republic during the period 1997–2003. The amount of financial support during this period is assessed by using the cost effectiveness analysis (CEA).

ECMT (2004). This study was the source for four data items concerning fuel tax refund of EUR 0.02 to 0.04 per litre in the countries France, Italy, the Netherlands and Sweden. The data span the year 2004 and cover road transport. The table contains the ECMT database on transport charges in European countries. It covers vehicle taxes, transit or overstay fee, fuel taxes, fuel tax refund, vignettes and tolls.

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