

Future organisation and financing of transport infrastructure

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*Report for
the Expert Group on Public Economics (ESO)*



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Foreword

In Sweden, annual investments in roads and railroads amount to about one per cent of GDP. Whether these investments should be greater, smaller or unchanged is a question that is often discussed. Related to this is the issue of who should be responsible for these investments. Sweden's central government has long had a dominant role in the sphere of transport infrastructure, and considerable government involvement is often taken as a matter of course.

What role central government should have in transport infrastructure investments, and whether there is justification for involving the private sector to a greater extent than is the case today, are questions that have been of interest to the Expert Group on Public Economics (ESO). A first step towards investigating this is to study how investments have changed over time in Sweden and to map international developments. For this reason, the ESO commissioned Björn Hasselgren to study exactly that.

In the report, the author establishes that the role of central government is influenced by several different trends. The importance of international cooperation projects is growing at the same time as new regional structures are emerging. Technological developments also enable new financing solutions, such as the employment of user fees. Partly for this reason, the author argues, it is important for the role of central government as owner and financier to be reviewed and reconsidered.

The report draws the picture of an international trend where fee financing is assuming greater and greater significance in relation to tax financing and where countries are testing new forms of organisation to a relatively large extent. The analysis results in a number of proposals that highlight various forms of collaboration between public and private actors. The author also believes that existing regulations must become more flexible in terms of increased competition and the use of alternative forms of financing.

The report constitutes a sound basis for further discussion on how infrastructure investments are to be organised. The work to produce the report has been followed by a reference group that has good insight into these issues. Heading this group was Lars Hultkrantz, member of the ESO Board. However, the author is himself responsible for the conclusions presented in the report.

Stockholm in April 2013

Lars Heikensten
Chairman of the Expert Group on Public Economics

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Summary

This report presents current developments in the financing and organization of road and railroad systems in different countries. An overview of six countries; the USA, Great Britain, Germany, Denmark, Norway and Finland, is provided. The description also briefly covers the current developments in the EU and Sweden. A general trend in many countries is that road pricing is becoming a more prominent part of the infrastructure financing and that alternative organizational forms, such as privatization, regionalization and public private partnerships (PPP), are more commonly employed.

In Sweden, the government has owned and financed the major roads and railroads since the nationalization process started at the end of the 1930s. Presently, the government's role as owner and financier is affected by the international changes in financing and planning. A general shift of responsibilities from the public sector to the private sector and within the spatial levels of the public sector is another aspect of challenges to the government's role. It is therefore important to take these developments into account when considering the government's future role in infrastructure projects.

In the report, I argue, that the Swedish government has to provide the road- and railroad systems with an effective and robust organizational and financial environment. Especially, the following issues for the organization and financing of the road and railroad systems have to be considered:

- The division of responsibilities between the government, the regions and the local governments
- Alternative financing measures in order to meet the development with shifting tax bases and to improve the efficiency in the systems
- The possibilities to organize transport infrastructure in more market like structures that enables innovation and reform

- The balance between welfare economic efficiency and possibilities to introduce stronger incentives for efficiency

The report provides a historical backdrop for understanding the development of the government's current role as owner and financier of transport infrastructure. A model is used for describing how this development has been influenced by technology, economics and politics, and how the balance between public and private ownership has changed over time. An observation is that the public ownership and policies over time have encompassed a number of inconsistencies. Management principles based on welfare economics and more organizational or business-oriented perspectives have varied in impact and importance.

Sammanfattning

I denna rapport redovisas en genomgång av utvecklingstendenser för väg- och järnvägssystemen i flera länder i vår omvärld. Genomgången visar att man prövar alternativ finansiering organisation mer i de flesta studerade än i Sverige. Det gäller både att vägavgifter införs och att en förändring av ansvarsfördelningen för vägar och järnvägar inom den offentliga sektorn samt i relation till den privata sektorn genomförs.

Statens roll i behöver anpassas till en ny situation för att väg- och järnvägssystemen ska få en effektiv och robust organisatorisk och finansiell miljö att utvecklas inom.

Ett antal förslag lämnas där en fortsatt utredning bör genomföras i syfte att formulera ett reformprogram för väg- och järnvägssystemen. Dessa huvudsakliga frågor bör ingå i en sådan fortsatt prövning:

- En ombalansering av uppgiftsfördelningen mellan staten och regioner/kommuner med en överföring av vägar och järnvägar till den regionala nivån
- En samtidig skatteväxling i samband med en sådan ombalansering
- En prövning av om det finns möjlighet att bilda ett Nordiskt trafikverk för de resterande mest centrala och gränsöverskridande delarna av väg- och järnvägsnäten
- En prövning av vilka delar av ett förändrat väg- och järnvägsnät som skulle kunna drivas i alternativa driftsformer, t.ex. som privata koncessioner eller i OPS -form
- En prövning av om alternativa skattebaser, som lokala fastighetsskatter i samband med infrastrukturobjekt, kan komplettera eller ersätta andra skattebaser.
- Ett aktivt arbete med att underlätta alternativ finansiering och organisation t.ex. med stöd i ökad avgiftsfinansiering och öronmärkning av trafikens skatteintäkter

- Underlättande av projekt i OPS-form med stöd av ett utvecklat regelverk som säkerställer insyn, en god riskfördelning och enhetlighet i projekten

Staten har ägt och finansierat de övergripande väg- och järnvägssystemen i Sverige sedan förstatligandet som inleddes i slutet av 1930-talet. Statens roll som ägare och finansiär påverkas av ett antal förändringar när det gäller finansiering, planering och ansvarsfördelning som gör att rollen behöver ses över. Förändringarna har att göra med den tekniska utvecklingen, ekonomiska och politiska förhållanden. Det finns goda möjligheter att genomföra åtgärder för att möta utvecklingen.

Följande balanspunkter för väg- och järnvägssystemens organisering och finansiering behöver beaktas när frågorna analyseras vidare:

- Uppgifts- och ansvarsfördelningen mellan staten, regioner och kommuner
- Alternativ till skattefinansiering för att möta förändrade skattebaser och för att öka effektiviteten i systemen
- Möjligheterna till organisering av transportinfrastrukturen mer i marknadsliknande former som öppnar för omprövning och innovation
- Avvägningen mellan samhällsekonomisk effektivitet och öppningar för starkare incitament för effektivitet och omprövning.

En utblick i sex andra länder och vad som just nu är viktiga utvecklingstendenser i väg- och järnvägssystemen redovisas. De studerade länderna är USA, Storbritannien, Tyskland, Danmark, Norge och Finland. Därtill tecknas en bild av utvecklingen inom EU och Sverige. En gemensam trend i flera länder är att avgiftsfinansiering stärks i relation till skattefinansiering och att man prövar nya organisationsformer, som privatiseringar, regionalisering och OPS i relativt stor utsträckning.

En bakgrund med utgångspunkt i ekonomisk teori och planeringsteori ger en ram för en avslutande diskussion om tänkbara åtgärder. Därtill diskuteras förutsättningarna för att nå en god resursanvändning i offentliga strukturer respektive i marknadsliknande former, i båda fallen på olika geografisk nivå. En iakttagelse är att den samhällsekonomiskt orienterade

1 Introduction, problem and purpose

In Sweden, as in many other countries, the government has a dominant role in transport infrastructure. The government assumed its present role in the 1930s and 1940s when locally managed roads and privately operated railroads were nationalised. This nationalisation took place after a long period of debate in which the arguments for and against nationalisation varied in strength. This development was mirrored in several other countries.

However, the debate and the policy pursued since the nationalisation have largely been content to conclude that transport infrastructure has the characteristics of a natural monopoly and is therefore an area where government ownership is considered to have advantages. Reform ambitions have instead been primarily directed towards the production of the transport services itself. Various re-regulation measures and modified forms of ownership have been tested in the management of the infrastructure systems, such as developed forms of contracting and procurements. At the same time, it can be argued that the core of the government assignment with government ownership and government financing has not been influenced to any great extent by these changes.

The government faces challenges stemming from several different trends. One of these is the *geographical dimension*, where international cooperation is increasing in scope at the same time as a new regional structure, with more extensive ambitions and resources on a regional level, is emerging in Sweden.

A *functional dimension* sees the role of government facing the challenge of new technology that makes it possible to introduce more advanced traffic management, but that also opens the door to systems with user fees to finance transport infrastructure. A more

advanced fee and financing model also opens for a clearer management of the transport system in accordance with environmental and sustainability dimensions. At the same time, more fuel-efficient vehicles and alternative fuels will eventually lead to erosion of the tax base that currently finances the transport systems.

Examples of this are the congestion tax systems in Stockholm and Göteborg, but a number of fee projects are currently being discussed and implemented for roads. Regarding railroads, the fees operators pay for access to capacity in Sweden are on the increase, even though the rate of future increases in these fees is uncertain. In most other countries, fees for railroad operators are also significantly higher than in Sweden, with a smaller proportion of tax financing. There are cases in other countries where a different distribution between fees for the railroad system and the overall regulatory burden on road transport has been chosen in order to balance the railroads' relatively inferior competitiveness with this kind of fee policy for the railroads. These combined trends create opportunities to develop more market-like forms of organisation in what was previously regarded as natural monopolies.

The report describes and analyses these trends. The starting point is in the historical development, while the perspectives are channelled via an overview of the international scene to a discussion of future potential organisational and financial solutions. The report's studies of how transport infrastructure is organised and financed in other countries is a starting point and source of inspiration for comparisons and analyses.

Starting with a general description of the historical development of Swedish road and railroad systems, an overview of the international scene as well as some theoretical perspectives on efficiency and planning, the report's overall purpose is to make a number of proposals as a basis for continued discussion and debate about the future organisation and financing of the road and railroad systems. The report's conclusions are also applicable in other infrastructure areas. However, this has remained outside the current focus of this report, but may be the subject of further studies.

The problems studied in the report can be summarised in this way:

- How in the future can we find a balance between the provision of roads and railroads under public management and under private management that meets the requirements of efficient resource utilisation and provides greater scope for technological and organisational innovation and reconsideration?
- How in the future can we find a balance between the various geographical levels (local/regional, national, supranational) that provides a rational division of responsibilities and tasks between the various levels with respect to roads and railroads and that supports efficient resource utilisation, while allowing scope for innovation and development? Does the research provide any support regarding these issues?
- How in the future will roads and railroads be financed in a situation where new forms of payment are emerging and where shifts in available tax bases are taking place?
- What challenges face the government in this situation and how can the role of the government in terms of the road and railroad systems be formed in various future scenarios?

One conceptual issue on which it is urgent to shed light is how the term “financing” is used. This partly refers to how the financing of projects for construction or maintenance is arranged, often termed “project financing”. It also refers to how the repayment of this project financing is arranged. In the case of publicly run projects financed through annual appropriations, the practical difference between the two aspects of the term “financing” is limited. However, in the case of projects that are run, for example, in corporate form, a separate balance sheet arises for each activity requiring separate financing, project financing or funding, while the flows for current payments to finance the balance sheet are collected through various forms of fees; from users or from clients.

The report discusses various hybrid forms for financing and organising roads and railroads. One such form that is often discussed is Public Private Partnerships, abbreviated PPP. This form is in use both in Sweden and in other countries.

In the report, the nationally (government) managed road and railroad systems are the focus of description and analysis. The reason for this is that these are the two dominant terrestrial

transport infrastructure systems that over time have been the subject of extensive government interventions. The financing of these two systems has also been based on taxes, albeit to varying degrees over time. For the road system, this has been the case almost the entire time during the 1900s and 2000s. For railroads, the proportion of tax subsidisation of activities has increased over time. From the end of 1980s, tax financing has fully covered the nationally managed railroad network, with the exception of track access charges paid by the railway operators, but which cover only about 10 per cent of the costs. Aviation and maritime infrastructure has, unlike the road and railroad systems, largely been financed with fees and is therefore excluded from the present discussion. Since 2010, the government's road and railroad systems have also been managed in the same organisation, the Swedish Transport Administration.

As a background to the report, visits were made around the turn of 2012/13 to Oslo, London, Berlin and Washington D.C. to gain an up-to-date impression of the discussion on the transport infrastructure systems in the different countries. Meetings were held with representatives of each country's ministry responsible for transport policy, with agencies responsible for roads and with research representatives. Similar interviews were previously conducted in 2011 and 2012 in Denmark and Finland as part of the ongoing research project conducted by the present investigator at KTH. The investigator also participated in the EU's "TEN-T days" on the development of transport infrastructure in the EU in Brussels in November 2012.

The report is based on current work towards a doctoral thesis at KTH in Stockholm entitled "Government's role for Transport Infrastructure" which has been presented and approved on August 26th 2013.

2 Historical development of transport infrastructure and challenges for the future

2.1 The emergence of the government's roll

Since the breakthrough of industrialisation from the mid-1800s, the transport infrastructure systems have been the subject of more or less continuous discussion about which organisational form is best for providing the road and railroad systems, and about how transport infrastructure should be financed. This discussion has its parallel in most Western countries.

The objectives of transport policy and hence for road and railroad infrastructure have changed since the 1930s. In the decades following nationalisation, the government's efforts focused on bringing about an efficient use of resources through competition between the transport modes. A cost centre for each transport mode would balance government revenues and costs for each mode. This policy orientation was relatively close to the policy of the interwar period. One essential difference was that the government had now brought the systems under its own auspices.

This focus of policy was gradually abandoned in favour of a broadened political objective with goals such as good transport supply throughout Sweden, traffic safety, regional development etc. A more economics-style approach has also had a gradual impact, with pricing and taxes based on short-term marginal social costs and on cost benefit analyses for the prioritisation of measures in the systems.

Over time, various forms have been applied for both organisation and financing. The organisation of roads and railroads has alternated between management by the government sector and by the private sector. It may be appropriate to base a discussion of

the current development of the road and railroad systems on an overview of the arguments that have been used for and against government involvement and on a model that can explain how systems such as that of transport infrastructure develop over time.

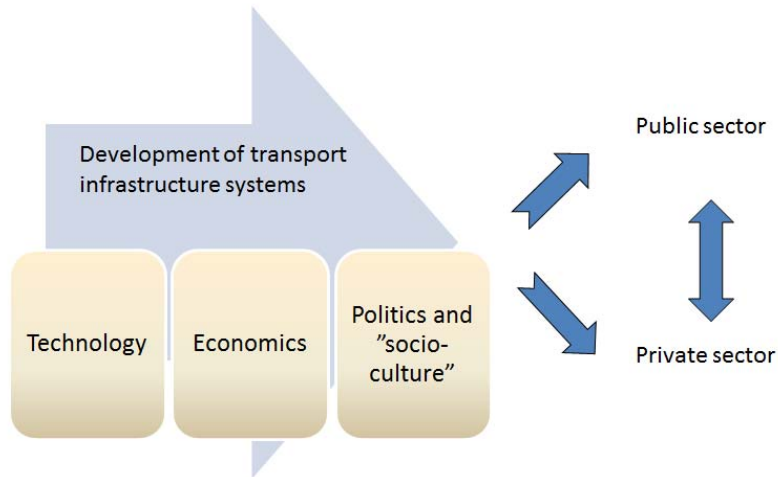
One such model is “path dependency”, where technological variables and circumstances are taken as a basis for explaining how investments in, e.g., railroad technology have spawned both a lock-in effect on this technology from a purely factual standpoint, but also in economic terms through, for example, the fact that the marginal cost for utilising existing technology and investments is relatively low. This state of affairs leads to the emergence of a kind of entry barrier that makes it difficult for competing technologies or solutions to establish themselves. Path dependency and government measures to create markets for other forms of infrastructure, such as telecommunications infrastructure, have been discussed by Andersson-Skog (2000).

A concurring view regarding the various lock-in effects and increasing marginal utility, which is often associated with positive “network externalities”, is found, for example, in Arthur (1989) and Pierson (2000).

Both of these approaches successfully capture essential features of the development of systems such as transport infrastructure. However, to describe developments over time, it is reasonable to seek models that can weigh in the influence of several different explanatory factors and that can also provide a broader understanding of the choice between different forms of organisation and financing solutions. More dynamic models of this kind have been developed in the context of evolutionary theory formation, originally within biology, but also applied to economic theory, in part to describe sequences of growth and dynamic development.

One way to describe a development process such as in the present case is shown in the figure below. Here, the development of transport infrastructure over time is seen as influenced both by technology and economic conditions and by political processes and socio-cultural factors or approaches to, e.g., the role of the government in the provision of roads and railroads. One result of the societal process of development with respect to the systems is a more or less conscious choice by the government between organising roads and railroads as part of the public sector or of the private sector.

Figure 2.1 A development model for transport infrastructure



A number of descriptions of economic development with a similar view are found among economists and economic historians. North (1990, 2005) has a perspective in which institutional framework conditions in different countries are emphasised with particular roles for economic circumstances and political institutions and by prominent roles for entrepreneurs in the ongoing development. Chandler (1992), Kaijser (1994) and Schön (2010) have all presented broad descriptions of the long-term development of technological systems and industrial sectors over time using this kind of dynamic perspective. Andersson-Skog (1993) has described the Swedish railroad system's development from an institutional perspective where the significance of various factors for this development is also studied.

Williamson (1981, 1999) has focused on the significance of transaction costs for the organisation of different activities in markets or in hierarchies. High transaction costs represent a circumstance that indicates that operations will likely be integrated in the same organisation. This is something that has in part been a motive for government intervention in infrastructure systems. In addition, Millward (2005, 2011) has described the emergence and development of several different infrastructure systems in Western European countries from the mid-1800s onwards. In particular, the interplay between the organisation of these systems under private and public management is a core element. A close parallel to the co-evolutionary model above is described by Clifton et al (2011).

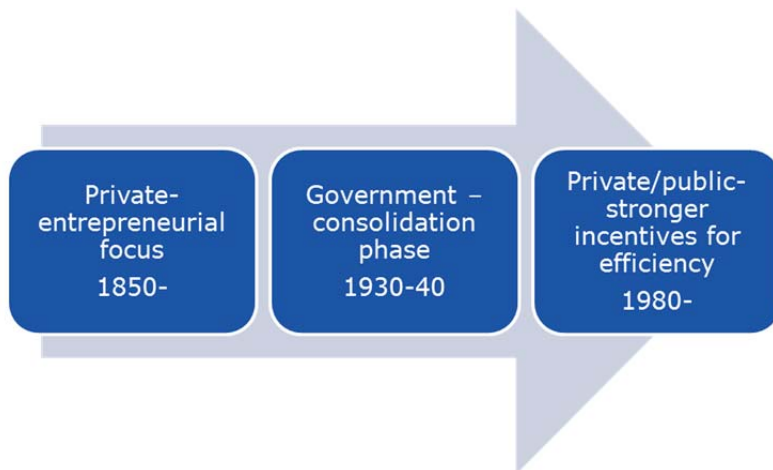
One article reports the influences of external factors such as technology, economy and policy and their influence on the development of infrastructure systems in Europe. Clifton et al argue that the understanding of transport infrastructure development over time can be sought precisely in these circumstances and how they have played into the development in different countries.

The interaction between activities in the public and private sectors and their interdependencies are something that has been described by Wagner (2007), working from a perspective where decisions within political systems and public finances can lead to situations where publicly organised activities “parasite” on privately run companies through various forms of underpricing or tax financing of their activities. Wagner operates in a theoretical field inspired in part by the Italian public-finance school, exemplified in this particular respect by Panteleoni.

Panteleoni was active in Italy in the late 1800s. He formulated a view of public finances positing that benefit assessments based on welfare theory generally steered parliamentary decision-making in financing issues. Panteleoni asserted, however, an individualistic perspective rather than an institutional perspective, see Medema (2009).

From a long-term perspective, roads and railroads in Sweden have been organised in both private/local forms and in public/central forms. Over time, these two organisational logics have alternated with each other, as illustrated in the figure below.

Figure 2.2 The alternation between private and public initiatives in Swedish transport infrastructure



Hasselgren (2013) has summarised the development of the government's ownership role and the view of the organisation and financing of the transport infrastructure systems since the 1930s by dividing the development into three main periods, with a starting point in the above model. These three periods and their characteristics are presented in the table below. The description starts in the 1930s because it was in the late 1930s and early 1940s, respectively, that the decisions to nationalise the railroad and road networks were made.

This first, almost 25-year, period (1939-63) of the government ownership of roads and railroads was characterised by a dominant influence of considerations grounded in business economics or institutional theory, but also by the lack of a formally adopted and coherent government transport policy. The principles for transport policy had instead been set by a government inquiry (the 1944 Transport Committee report - SOU 1947:85), whose proposals did however not result in formal decisions. The political considerations and objectives were not as developed and nuanced as they have later become.

In 1963, the Riksdag made a first comprehensive decision regarding transport policy following the nationalisation, which included issues of transport infrastructure, since the government assumed ownership of roads and railroads. Here, various economic arguments continued to dominate standpoints and rationales for

government action and the design of ownership policy. A welfare economic approach, alongside continued demands for an approach more inspired by business economics with respect to the individual systems, came to receive greater scope than before.

The next 25-year period (1963-88), the endpoint represented here by the decisions for a division of the former SJ into the new SJ and the Swedish Rail Administration (Banverket), was characterised by a mix of management principles of a business economics orientation, with an increased scope for welfare economic approaches. This is especially pronounced from the 1970s, when several government inquiries worked on the task of introducing this kind of broader economic approach to the assessments of, for example, the economic profitability of investments.

Table 2.1 Development of the road and railroad systems and the government's ownership role

| Factor and chosen organisational model | 1939-1963 | 1963-1988 | 1989-2010 |
|---|--|---|---|
| Technology <i>(roads and railroads, rolling stock etc.)</i> | Strong influence | Diversified use of existing technology | Increasing importance for the development with ITS solutions and a sustainability focus |
| Economy <i>(organisational design, competition, pricing policies, etc.)</i> | Strong influence cost centres and competition focus | Strong influence welfare economic approach grows in importance | Strong influence welfare economic approach dominates |
| Policy <i>(market or intervention)</i> | No clear political ownership-related reasons for nationalisation | Growing importance for regional policy and distribution policy | Strong influence Sustainable development and focus on citizen influence on the planning |
| Public sector or Private sector | The publicly managed market economy with competition focus | Competition between the transport modes under government management | Continued government ownership with certain opportunities for alternative financing and privatisation |

Source: Based on Hasselgren (2013).

An explicit cost responsibility principle (where users are in principle expected to pay the full cost of the transport mode's facilities and operations) for each of the various modes was until the 1980s a central part of government ownership policy, at the same time as matters of regional equalisation and increased interest

in the welfare economic aspects of the infrastructure systems grew in strength.

The period from the traffic policy decision in 1988 has been characterised by a gradual raising and expansion of aspirations in terms of policy areas besides the purely financial or technological aspects of roads and railroads. This became particularly evident in the transport policy decisions of the 1990s, when a broad view was established of the many different political objectives (distribution and regional policy, economic efficiency, traffic safety, environmental aspects, etc.) that were to be achieved with the aid of transport infrastructure.

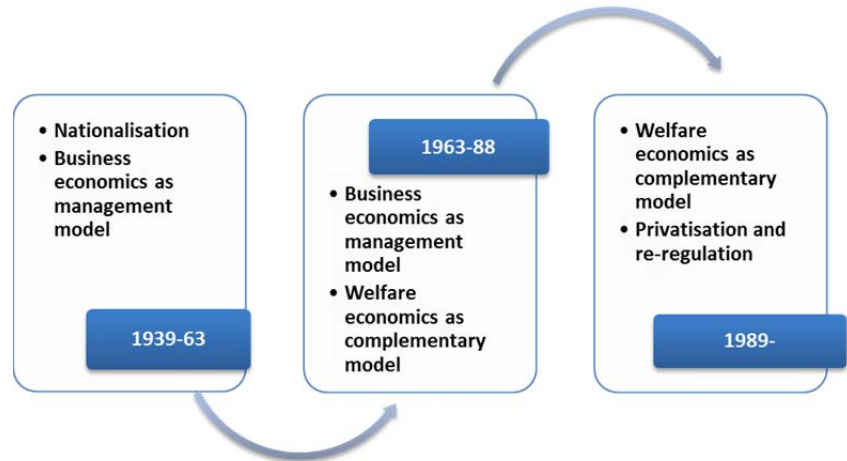
Questions about the growth effects of transport infrastructure and of the environmental impact of transport have thus had a greater impact on government transport policy over time and on the role of the government as the owner of roads and railroads. In addition, there has been an increasingly clear emphasis on an intermodal approach. This has, among other things, led to joint investment plans for the various transport modes and to the 2010 merger of the former road and rail administrations into the Swedish Transport Administration (Trafikverket). The merger was also motivated by the desire to achieve savings through a more developed market for various contractor services.

Pricing based on welfare economics (often short-term social marginal cost) for both road and railroad traffic was already identified as the overarching principle in the 1970s. This principle was applied over a longer period alongside a more business economics oriented (full cost coverage) approach. It is only in the late 1990s that it can be asserted that the government more unequivocally endorsed the welfare economic principles, even though this emphasis has varied in the practical design of policy. In parallel with the stronger impact of economic principles, it is also possible to see that the previous cost responsibility principle that was dominant from the 1930s has come to have a narrower scope in the government's management of roads and railroads.

It is something of a paradox of timing in this development that while a welfare economic approach has had an impact on financing and governance that can be said to be close to a public-sector form of management principles, the government has opened the door to various forms of alternative financing and even sale or at least reorganisation of parts of the infrastructure, primarily that of railroads. Certain road user charges and track access charges are

being employed and are intended to be expanded in the near future. However, the pace of this is unclear. The government ownership and financing of roads and railroads thus appears to be in a state of change.

Figure 2.3 Three periods of government control with conflicting management principles



The fact that the government's ownership of roads and railroads is surrounded by partly conflicting principles appears over time to be a basic theme of government involvement in the sector. This may be viewed as an expression of the multi-dimensional objective, which over time has also become increasingly complex. In summary, three stages in the development of the government's management and policy principles can be discerned with regard to the management principles, as set out in the figure below.

2.2 The government's future role

Looking forward, it is obvious that there are a number of trends that both the transport infrastructure systems and the government encounter in this area. The development has its origin in the different factors in the development model; technology, economy and policy. In summary, it can be said that the role of the

government in the transport sector faces challenges both geographically and functionally.

Geographical challenge

In the territorial dimension, the challenges come from both the international and the local/regional levels. The international dimension has evolved over time, with increased activity in the area of transport infrastructure, mainly within the EU. The common transport policy, of which transport infrastructure is an integral part, has an explicit role in the EU's work. Transport policy is set out, among other places, in the Treaty on the Functioning of the European Union (Articles 92-100, 170-172) as an essential means of achieving the goal of a developed and well-functioning single market with the free movement of goods, services and citizens. Since the early 1990s, the European Commission (the Commission) has pursued an active policy to define and develop a comprehensive network of roads, railroads, waterways and aviation infrastructure, together known as the Trans-European Networks for Transport (TEN-T).

International exchange has also increased in other ways with respect to transport infrastructure. The importance of trade for the Swedish economy grows over time, and the call for effective transport solutions that are also environmentally sustainable places great demands on coordinated planning between Sweden and its neighbouring countries. Several projects with this orientation are also being run. The major bridge projects, the Öresund Bridge and the Svinesund Bridge, are just two examples.

The new situation that has gradually emerged places ever greater demands on the government to act in the international arena. The Swedish transport infrastructure systems are becoming increasingly integrated in a European and international network. There is a tendency for influence on regulation and financing to move over to international negotiations and supranational forums. Due to this, it will probably be possible to increasingly realise economies of scale in transport infrastructure at the international level, rather than at the national level. The government thereby needs to focus more on this level in the future.

In the local/regional arena, a shift towards a more challenging role for the government is also discernible. The government

agencies, mainly the former Swedish Road Administration and the Swedish Rail Administration (now coordinated in the Swedish Transport Administration), could previously act relatively independently at all geographical levels in the national system. At the same time, the government has opened the door to various forms of influence from the regional and local levels in the planning of maintenance and investments. Among others, the regional self-government bodies, mainly in Skåne and Västra Götaland (in the south and on the west coast of Sweden, respectively), have assumed a clear responsibility for the regions' transport infrastructure in collaboration with the government. Also in other parts of the country, with varying forms of regional collaboration, the regional level has advanced its positions with its own regional transportation visions and decision-making authority over funds allocated to the respective regions by the government.

Extensive negotiations between the government and the regions have been pursued in relation to several major infrastructure projects and have resulted in agreements. These include the “City Tunnel” in Malmö, the “West Swedish Package” (Västsvenska paketet) in Västra Götaland and the “Stockholm City Line”, the “Stockholm Bypass” (Förbifart Stockholm) as well as several other road and railroad projects in Stockholm. A tradition of such negotiations has previously existed, mainly in the Stockholm region. The new regional structure to society that is now emerging has accentuated the government's negotiating role. It is no longer a given that the government is able to exercise discretionary powers at the regional and local levels to the same extent as before.

At the local level, municipalities and other actors have an ever greater and advanced collaboration in order to develop the transport systems in tune with local interests and user interests. Increasing this collaboration and opening activities to a more cooperative way of working has also been one of the main reasons behind the formation of the Swedish Transport Administration, see e.g. the Swedish Road and Rail Administrations Inquiry report (SOU 2009:31).

Part of this collaboration is the continuous joint planning taking place between municipalities, road and railroad operators and companies in order to design the road and railroad systems as well as possible in the local context. The government/road and rail administrations have increased the level of ambition in recent years. The road and rail administrations' joint project, “The Livable City”

(Den Goda Staden), is one example of efforts to develop this expanded collaboration. This type of coordinated planning of small and large initiatives in the systems often sees both joint planning and financing of various measures such as stations, road links and public transport measures. The method of co-financing is one such example of joint planning.

The regional and local levels also organise themselves in order to influence government planning and priorities in a purposeful and vigorous manner. Several of these activities have been underway in recent years, for example with stakeholders for railroad initiatives such as the Bothnia Line in the north and high-speed railroads, but also in connection with road projects such as the Stockholm Bypass. Here, the local and regional levels become a strong counterpart to the government, both as a political force, often with good relationships with the Government Offices, but also as a principal financier, in the form of co-financing of government projects. In the latest round of planning for transport system development for the years 2010-2021, municipalities and regions have, under such agreements, contributed approximately SEK 20 billion in financing to the government framework. In addition, municipalities and regions have contributed towards an additional SEK 50 billion in new congestion taxes and charges of various kinds to be implemented to match government financing. In many ways, the government is thus meeting counterparts that challenge the traditional role in the territorial perspective.

At the same time, it may be noted in this context that most of the projects that have come into being under the designation of co-financing maybe do not really add very much that is new compared with previous collaboration models. The resources supplied through co-financing have, for example, largely been a matter of the levying of government congestion taxes on the government road networks of Stockholm and Göteborg. In many of the other projects under this heading, it is perhaps more a matter of measures that would still have been implemented by regions and municipalities now having been grouped together in an integrated co-financing project.

Functional challenge

The challenge in the functional sense comes through the development of new technology and new forms of financing, some of which have already been mentioned above.

Prominent with respect to new technology is the greater technical capacity to levy a charge for the use of road and railroad infrastructure in the form of congestion taxes, bridge tolls and charges on the railroad network etc. Coordination is also underway at the EU level to create a common payment system to facilitate transport through the EU. Different charging systems are being synchronised through transponder technology, but also in terms of the payment systems so that effective settlement forms are introduced. Within a few years, the prerequisites for pricing and financing transport infrastructure have changed. The closer linkage of the revenue side to the activities thereby emerging alters control impulses and incentives in the systems. Here lies a significant potential for improving efficiency, both by the users' demand being able to have a more direct impact, but also by clear revenue streams in themselves creating a better basis for internal efficiency improvement in transport infrastructure organisations.

Another change that may be mentioned in a functional respect is the increasing use (outside Sweden) of various collaborative projects between the public and private sectors, known as PPP. While this method is relatively widespread in several countries in the EU, and actively promoted by the Commission and the European Investment Bank (EIB), in part through the new Project Bonds Initiative, it is rarely used in Sweden. The introduction of these operational forms results in components of what has been considered part of the government's role in transport infrastructure being transferred to the private sector.

The pros and cons of PPP solutions have been highlighted in several reports, including the EIB (2005, 2010). Properly designed, they have the potential to benefit from the stronger incentive structure, which can often be arranged in such companies or projects compared to the public sector. This provides a basis for efficiency improvements covering construction, operation and maintenance that are difficult to achieve in the public sector. Disadvantages of PPP solutions that are usually pointed out are that the private companies' borrowing cost is generally higher than the public sector's borrowing costs. In many PPP projects,

efficiency improvements in construction and operation outweigh the, in certain cases, higher financing costs that PPP projects can have compared with government borrowing.

In addition, an overly extensive transfer of risks to the private companies may additionally create a basis for recurrent profitability problems in the PPP companies, resulting in demands to renegotiate contracts. This is at present the case, for example, in the United Kingdom; see National Infrastructure Plan for UK (2010). Despite objections to the use of the model, it seems unlikely that Sweden over time would position itself outside a trend towards more fee-financed transport infrastructure projects. A reasonable prognosis is that such projects will increase in extent in Sweden.

Overall, there are several examples of how the government's role in transport infrastructure is facing trials ahead. More market-like solutions and supranationality are gradually being developed. Regional and local levels are demanding increased influence, and new forms of financing are driving organisational change in the government's role. It is no longer a given that efficiency in the system is achieved through a broad government involvement mainly at the national level.

3 An overview of other countries and the EU

What follows is a presentation of a number of current trends concerning the governance, organisation and financing of roads and railroads in the United States, within the EU at the Union level and in the Member States – the United Kingdom Germany, Denmark, Finland – and in Norway. For some of the countries, this report has chosen to mainly describe the development of the road system. Either this is the part of the system that is subject to the most extensive changes at present and/or the systems are so complex that time did not allow the more comprehensive study that would be required to cover both transport modes. For the United Kingdom and Norway, more detailed descriptions are given than for the other countries on the grounds that they have particularly interesting examples of re-examining of the government undertaking and of regional organisational forms. Finally, a similar presentation is given for Sweden as well as a summary of the country studies.

3.1 United States

General

Transport infrastructure in the United States is divided between the federal level, the states and the regional/local level. Road issues carry greater weight than railroad issues at the federal level. The single largest program relates to the organisation and financing of the nationwide road network, the Interstate Highway System. Rail freight transport, including the railroad network for this transport, is largely organised in the private sector through a number of competing companies. Long-distance passenger transport is

operated by Amtrak, the federally owned passenger transport company. In addition, there is a relatively large number of metro, streetcar and commuter rail systems in the major cities. These are generally operated by state or regional/local public transport authorities.

Roads

The road network (here Interstate Highways) is financed by the federal and the state levels. The road network is owned by the states and under the administration of state road authorities. Coordination takes place through the Federal Highway Administration. Ever since the decision in 1956 to build the Interstate system, its financing has mostly been based on taxes on fuel and vehicles levied at the state and the federal levels. This money are held separately in a special “fund” in the federal budget. Grants amount to about USD 35 billion per year in a total transportation budget of about USD 50 billion per year. The original intention was that these funds would only be used for road construction. Gradually, however, they have come to be used for a range of other programs, such as public transport initiatives, traffic safety measures and e.g. cycle paths.

This situation, combined with the fact that the federal fuel taxes have not been adjusted since the 1990s, has led to the financing of the Interstate system becoming increasingly strained. Contributing to this is, of course, the fact that the successively more fuel-efficient vehicles mean that fuel consumption, and thus tax revenues, no longer have a clear linear relationship with traffic and the wear and tear on roads. The ever tighter budget situation has become increasingly manifest at the same time as the maintenance and reinvestment needs of the road network have become accentuated. This is partly due to several parts of the road network having begun to reach the end of their technical lifespan and partly because the congestion problem of many cities has been amplified through increasing urbanisation.

Financing

Since the early 1900s, when road traffic began to grow, the public financing of the road network has dominated, albeit with the exception of turn-pikes (toll roads), seen in some states and certain individual projects. As financing for road projects has become more and more scarce, the discussion on the alternative financing of roads has increased. Several different projects with fee financing have also come into being. These include several cities' addition of extra lanes to existing roads. These have in many cases been financed with fees/tolls and in some cases been operated by private companies directly or as collaborative projects.

The great political opposition at the federal level to increasing taxation for the transport sector (and other sectors) in combination with the strained budget situation in the United States means that the federal level does not have the opportunity to fully meet the needs of financing, either by measures on the road network or by measures to strengthen public transport and projects such as high-speed railroads for passenger transport. Several measures of this kind, as well as proposals to institute a federal infrastructure bank, were part of the Obama administration's proposals for the 2012 budget. The proposals have essentially not been acted upon by Congress, which has instead focused on presenting a federal budget that aims to resolve the short-term "budget crisis" in the fund for the Interstate system. Furthermore, the Republican majority in the House of Representatives proposes a relatively radical simplification and reduction of federal grants to various transport-related programs.

The consequence of the constrained federal budget situation, which also has its counterpart in several states, is that interest in the alternative financing of roads and railroads for passenger transport in cities has increased in recent years. Several projects of this kind, which cover maintenance, reinvestment and new construction of roads and railroads, have been carried out in recent years and are planned.

One state that has been active with these projects is Virginia, which has adopted specific legislation on PPP projects. This opens the door to bidders/proposers to submit proposals for projects that are then considered for possible implementation. The legislation has provided a solid legal foundation for these projects and opened the way for a number of major PPP projects, including those on

the road network. The state's representatives emphasise the gains offered by the PPP model in the form of limited risk for the building process and also the fact that the projects are delivered on time. The financial component of PPP projects is also essential, because the projects do not burden the state's balance sheet and borrowing requirements during the project period.

There are also several examples of referendums on proposed infrastructure projects, both with respect to new construction and maintenance of roads, and of metro/tram projects being organised at the local level and at state level. One experience from several places is that these referendums relatively often lead to a majority in favour of the proposals, even in cases where the tax increases are the financing model. This may then be a matter of a number of clearly defined measures linked to financing through such things as local sales tax or property tax. One example is the extension of the streetcar system in Denver, Colorado, which is financed through a combination of state, federal and municipal grants. These are supplemented by a sales tax of 0.4 per cent over a dozen years and by various PPP projects. Active efforts are also being made to bring about an attractive urban development adjacent to the new streetcar stations, which in themselves can create value and generate a tax base.

There are several different federal and state systems where public financing can be mixed with private financing. One model means that local governments and states can borrow against a future tax revenue stream by issuing special bonds. This model is relatively common for meeting the needs of project financing.

A fundamental intention behind the federal financing of the Interstate system is that there should be a direct link between the tax revenues from traffic and the federal investments. Over time, this principle has seen a breakthrough in that the collected tax funds have also been employed for other purposes, but also by the fact that general tax revenues have been used to finance the road network. The state level has basically the same principle of balance between taxes and grants. Also at this level, however, there have been deviations from this principle. One impression from studies of financing discussions is that they often seek to identify a financing model for new projects that involves covering the costs and, in the case of projects with fees, they primarily seek a business-oriented financing model, rather than balancing fees/charges according to welfare economic principles.

3.2 EU

Transport policy in general

The EU is in a phase of development which sees the continued expansion of road and railroad links between Member States as an important part of cohesion policy and of the building of the internal market. The current renewal of EU transport policy, with measures both for the transport markets and the infrastructure, has also been highlighted as one of the key areas of Union efforts to revitalise the work of the internal market as a result of the financial crisis since 2008.

The EU has been active in the field of transport infrastructure since the 1980s, but with increased efforts since the 1990s. It may be noted that transport issues and transport infrastructure are specifically mentioned in the EU Treaty as an area of activity for the Union¹. At the same time, responsibility for the ownership and operation of roads and railroads lies with the Member States.

The Treaty covers provisions aimed both at establishing a common internal market for cross-border transport and at establishing Trans-European Networks (TEN), including transport infrastructure. Common principles in EU policy are non-discrimination, the development of technological compatibility and measures to enhance joint planning and coordination. Measures taken by the EU are to be founded on the principle of transparent and competitive markets. The Treaty also stipulates that the EU may contribute to financing through loan guarantees, interest subsidies and through the direct (co-)financing of projects prioritised by Member States.

In one respect, the EU is in a similar situation to that of the United States before the construction of the Interstate system in the 1950s. Relatively good national networks exist, with quite a lot of links between countries and regions. Links and connected cross-border corridors which bring together different transport modes that better tie together the various regions and countries of the EU, both in a North-South and an East-West direction, represent an important element of the EU's plans for improved transport infrastructure. For these new transport corridors, various forms of joint organisation and governance are also being discussed at a transnational level. At the same time, the increasing trade between

¹ Articles 92-100 and 170-172 of the Treaty on the Functioning of the European Union.

EU countries as a result of the building of the internal market leads to sharply increasing transport flows. For this reason, reinforcements of existing transport routes are another essential aspect of the EU's transport strategy. Generally, the EU is working for a reinforcement of the transport systems in the Member States of Eastern Europe, where the systems have long been less well developed than in Western Europe.

A number of processes are underway to review and further develop the EU's infrastructure strategies and measures. A foundational document is the Commission White Paper of 2011. This aims to establish guidelines for the EU's transport policy until 2050 and is a follow-up to the 2001 White Paper. Questions of how to achieve a sustainable transport system by means of reductions in emissions and other environmental impact are priorities. Other issues are how the common transport market is to be promoted and how the infrastructure can be strengthened. The Commission points to the need of identifying a priority (core) strategic network of roads, railroads and other infrastructure. The EU's measures should be focused on this network. According to the White Paper, several different sources of financing will be required to realise this network. A mix of public funds, private financing, and increased user charges are stated to be the primary sources of financing.

With regard to the pricing of infrastructure use, the White Paper mentions a focus on the internalisation of external costs, such as noise and emissions, in the fees that the users will encounter. This will provide the public system with financing for any compensatory measures at the same time as users encounter a price or fee which reflects these costs. The positive externalities that transport infrastructure investments might provide are, according to the White Paper, justification for the existence of some public financing of these. One of the financing forms mentioned is the Project Bonds that the Commission has proposed as a borrowing form, in part to finance PPP projects. For these bonds, which are intended to be issued by private actors, the EU Commission or the EIB may issue guarantees in order to strengthen creditworthiness. It may be noted that this procedure is similar to the measures applied by the Swedish government during the development of railroads in Sweden in the 1800s.

The various regulations for the transport modes generally emphasise the principle of marginal cost pricing based on short

term marginal social costs combined with an ambition of full cost coverage for each mode.

The TEN networks - the EU "Interstate system"

In parallel with the White Paper, a revision is being made of EU's objectives documents for the development of the TEN networks. According to the Commission's new proposal for objectives documents² from autumn 2011, the measures from the EU will focus on the prioritised network (core network), covering measures for the ten corridors for railroads, airports and ports and their connections to road and railroad networks. In March 2012, the Council of Ministers endorsed the Commission's proposal that was treated by the EU Parliament in autumn 2012. The goal is for the projects to be completed by 2030. This means an explicit mobilisation of efforts with respect to the links in the system that have the highest priority as compared with previous strategy documents where a greater number of projects were included in the EU's list of priority measures. In the new proposal, measures in greater parts of the network, mainly in parts that are perceived to be of national interest, are delegated to the Member States for financing and implementation.

With regard to financing, there is a proposal to merge the EU's funds for the TEN budget (about EUR 8 billion for the period 2007-2013) with financing from the Structural Funds into a "Connecting Europe Facility" (CEF). In this way, EUR 31.7 billion would be released for investments in the priority network for the period 2012-2020. The funds should be able to be used flexibly for different types of financial measures such as direct grants, loan guarantees, interest subsidies etc. A maximum of 40 per cent of the costs (for cross-border projects) can be covered by EU financing. Other costs may be covered by Member State financing and private sector involvement. The new package of measures and the CEF mechanism are partly intended to be financed through resources being taken from the Structural Funds and the Equalisation Funds, something previously criticised by Member States that were net beneficiaries.

Increased private sector involvement is one of the EU's objectives. According to the Commission's experience, EUR 1

² COM/2011/0650 final/2 - 2011/0294 (COD).

billion in EU financing at best gives rise to EUR 20 billion in investments from the private sector overall. This reasoning is probably based on a very broad view of which investments in the private sector may be considered to be associated with the individual transport infrastructure measure. It is also possible to understand the stated interest in private sector financing from the perspective of the EU disposing over relatively limited funds for transport infrastructure measures when compared with the United States, where available funds at the federal level are about eight times higher than in the EU.

An essential part of EU measures in transport infrastructure has been, and will be, to promote various types of collaboration between the public and private sectors on transport infrastructure. During the current period, the Commission is, through its own expert authority for TEN issues (TEN-TEA), pursuing a number of projects to promote the use of PPP as a form for providing transport infrastructure. The same is true of the EIB, which has transport infrastructure as one of its largest lending sectors. Loans from the EIB are to a significant extent given to projects run in PPP form.

Transport infrastructure and transport policy have undoubtedly assumed a progressively more important role in the EU's policy areas. This picture is confirmed by the current strategies, which entail a clearer mobilisation in fewer, but transnational projects, and the forthcoming measures to further open up the internal railroad market. At the same time, there is a picture (see *inter alia* Johnson and Turner, 2007) of the Commission having somewhat toned down its previous focus on deregulation and privatisation in order to rely to a somewhat greater extent on the existing actors in the national markets, often with a government background, to implement its policies. As in many Member States, it seems reasonable to discern, also at the EU level, an interplay over time between different types of measures to strengthen the internal market, but also a difference over time in terms of the balance between public and private actors.

3.3 United Kingdom

General

The responsibility for roads and railroads in the United Kingdom is divided between the national level (England, Wales and Scotland) and regions and local authorities. At the national level, the National Highway Agency, which is part of the Department for Transport, is responsible for the nationwide road network. The railroad network is managed by the government-regulated organisation Network Rail, which is financed by government appropriations and user revenues. In addition to these projects, there are a number of privately financed rail projects and extensive railroad systems for public transport, among other places in London, which are run by the regional/local authorities. Appropriations financing based on fuel taxes is dominant in the road and railroad network, but some user financing with fees also exists.

There is a very extensive literature on the railroads' nationalisation, privatisation and return to a more publicly managed model. In this respect, the United Kingdom stands out as the country in Europe that has tested the most far-reaching model for the re-regulation of railroads. The railroads are now organised by means of a non-profit company, Network Rail, which is largely financed by the government, but also by user fees from railroad operators. An overview of the re-regulation processes is provided by Jupe and Crompton (2003), which questioned whether Network Rail will be able to meet the challenges faced by the railroad system in the early 2000s. Developments since then have entailed both successes through significantly increased railroad investments and maintenance, but also a rapidly growing debt burden for Network Rail, and recurring discussions as to whether this is an organisational form that provides a sufficiently clear accountability for the management and incentives for efficiency.

Alternative financing in PFI form, etc.

Since the early 1990s, the United Kingdom has pursued an active policy to implement investment projects through collaborations in PPP form. In the United Kingdom, these have been known under the designation of Private Finance Initiative (PFI). Some 700

projects have been implemented since 1992 with this project form. The distribution between different sectors has been great, but in many cases the road and railroad projects have been implemented at the national, regional and local level in the United Kingdom.

PFI has been employed by both Tory and Labour governments in the United Kingdom. The method has been viewed as a means both to increase the extent of funds available for the financing of, for example, transport infrastructure, and to increase efficiency in the implementation and delivery of projects. The vast number of projects implemented has led to substantial amounts annually burdening public finances in order to pay the companies running projects in PFI form.

Investigations from, for example, the National Audit Office, have shown that projects implemented in PFI form are implemented faster and at a lower cost than corresponding projects implemented by the public sector. At the same time, there has been a lot of recent criticism of PFI projects. Attention has in part been drawn to insufficient regulation of agreements, which has meant criticism against perceived “excess profits” in PFI contracts. Also questioned is the possibility of the public sector frequently getting into a dependency relationship with the private actor that controls assets over a long period as a monopolist through the agreements. In a number of high-profile cases, the government has also had to take over projects from external parties where threats of bankruptcy could not be averted by other means.

This extensive criticism has been one of the reasons why the government initiated a major overhaul of the continued use of PFI as a method for running transport infrastructure projects of this kind. The overhaul has resulted in a package of measures to enhance the regulation of PFI projects in terms of greater transparency in the projects, accounting and bookkeeping, as well as the allocation of project risks between the public and private sectors. The latter relates, among other things, to the public sector in future being able to secure the opportunity to participate in profits arising in PFI projects. In December 2011, the government presented a proposal for changes where these various proposals are summarised. In December 2012, the government presented its final proposals, which are in line with the proposals from autumn 2011. This updated form of PPP project that is now intended to continue is designated by the new approach as “PF2”.

One change compared with the previous PFI model is that the government and the rest of the public sector will, in the PF2 model, assume a greater share of the project risks, in part through direct ownership and board representation in the projects. The government has also particularly signaled its intention to strengthen joint procurement expertise so as to bring about the best possible conditions for the government and other public sector actors in the projects. Finally, standard agreements for PF2 projects have been produced that can and should be used to decrease project risks, but also to reduce transaction costs.

A common view of the future use of PFIs among several actors in the United Kingdom seems to be an increasing focus on the efficiency improvements that can be achieved by bringing about stronger incentives for efficiency and sustainability in the management of projects by means of life cycle costing (LCC), which is often a part of a PFI approach. Similarly, there appears to be a consensus on the need to reduce the focus on the financing component of PFI projects and to increase the consensus on which project risks are best assumed by which party. These are measures that should reduce the risk of projects not suitable for private sector involvement being run solely or primarily in order to resolve short-term financial problems, such as by transferring too much risk to the private party. With respect to roads and railroads, it may be a matter of too great a portion of project risks in the construction phase or of market risk (e.g. traffic volume on a road) in the operational phase being transferred to the private party.

Alongside PFIs, there is a relatively large extent of mixed financing of individual major and minor infrastructure projects in the United Kingdom. This relates, for example, to the rebuilding of railroad stations where Network Rail runs several projects in collaboration with property owners and local authorities. For the construction of the new railroad line in the East-West direction in London, Crossrail, local property/sales taxes are applied around the locations of the new stations in order to inject the project with external financing. Similar solutions can be found at the local authority level where there is the opportunity to introduce local taxes, known as Tax Increment Financing (TIF) as part of the financing of infrastructure projects.

A change to the organisational form and financing of the national road network?

In a speech in March 2012, the British Prime Minister David Cameron announced the proposal that new fee-financed motorways and trunk roads in the country could be built by private companies under license. These solutions aim, at least initially, for more extensive separations from the government than the PFI projects. An implementation of this proposal would significantly alter the balance of the UK's road system towards a fee-financed model. This proposal was grounded in a report from a working group of the Highways Agency (HA) known as the Cook report or the Road reform initiative. The report contains a series of proposals to increase efficiency and the user orientation of the HA's activities. These include financing that is proposed to become more fee-based in future in the national road network, the organisational form of the HA, which is proposed to become more independent from the government and working forms and organisational culture at the agency, which are to shift from a culture of authority to one that is company and user-focused.

A working group is currently working at the Department for Transport and the HA to make a more detailed proposal for how a new organisation could be designed. Proposals for this must be reported in spring 2013. A model of fee financing of the nationwide road network managed by the HA is being considered. The proposal would see a tax shift being made between taxes and a monthly subscription fee paid by users of the road network. Some kind of fee model will also be considered for the variable costs.

A main objective of the model now being investigated is to achieve a solution that lies outside the government's balance sheet. For this reason, alongside the continued use of an agency solution, models are being considered whereby private interests take over the road network, preferably financed with pension asset management funds as investors. With this model, a regulatory authority similar to those for, e.g., the railroads and the water systems would be established for the supervision and monitoring of activities.

Privatisation measures

There are also instances of pure (re)privatisation. One example is the privatisation of the first high-speed project (HS 1), which covers the approximately 100-km high-speed railroad between the Channel Tunnel and St. Pancras in London and three other stations along the route. Two Canadian pension funds own the company High Speed 1 Ltd (via the company Borealis Infrastructure), which holds the concession for the railway. A number of companies, including Network Rail, serve as infrastructure managers for both the line and stations. Borealis bought the 30-year concession rights for GBP 2.1 billion in November 2010.

Another major rail project is the recently launched HS 2 project, which aims to build a new high-speed railroad from London to Birmingham in an initial stage. In a second stage, an extension to Manchester and Leeds is planned. The total cost is reported to be approximately GBP 32 billion for the entire project. Extensive work may be expected with regard to finding financing solutions together with the private sector and actors from various levels of the public sector. Intensive planning for this project has now commenced.

Railroads

In conjunction with the Office of Rail Regulation's (ORR) current preparations for its review of Network Rail's activities for the forthcoming regulatory period (2014-19), a number of opportunities for bringing about an improvement in productivity in Network Rail are being considered. It is estimated that productivity has increased by about 20 per cent during the current period, but the preliminary target for productivity improvement in the coming period is about 40 per cent. Productivity improvements have occurred both through cost reductions and increased availability/increased transport work.

The organisational form with "off-balance" activities is to be retained according to government directives. However, an opening is conceivable for changing the form of activities in a way that can enhance management from the owner representatives (industry and persons appointed by the government) leading the company. In conjunction with these considerations, an analysis is also being

performed of whether it would be appropriate to “re-integrate” parts of the activities so that Network Rail and the operators form a more permanent partner organisation for issues such as railroad maintenance planning. Whether this collaboration is to be organised on a voluntary basis or by regulation may come under consideration in the future.

3.4 Germany

General

The organisation of transport infrastructure in Germany is greatly influenced by the country's federal form of government. The division of tasks and responsibilities between the federal (Bundes) level and the 16 states (Länder) is similar to that in the United States. Roads are thus divided between the federal level and the state level, and further down to the regional and local levels.

The biggest roads are called ‘Bundeswege’, covering about 12,800 km. At the state level, there are approximately 56,000 km of ‘Länderwege’, while municipal roads and streets cover about 68,000 km. Planning is done both at the national and state levels, something which means that the planning of road measures, for example, is not always fully coordinated, according to several interviewees. Although the financing comes from the federal level, the states emphasise from time to time that their road administration activities are independent, which can make coordination of the system complicated.

However, the railroad system is largely a federal task, and dominant here is the federally owned Deutsche Bundesbahn (DB) and its subsidiaries in various areas of activity, such as traffic and infrastructure. In the framework of a vertically integrated structure, there is a relatively high level of autonomy that is designed to maintain the independence required by EU regulations, such as those on the allocation of capacity to different actors on objective grounds.

Fee financing of roads and PPP projects

The predominant part of the financing for the road system and other parts of the transport systems in Germany comes from tax

revenues. Since 2005, however, heavy vehicles have been burdened with specific charges levied on the nationwide road network. The tolls/charges currently generate about EUR 4.5 billion per year in revenues. This compares to the approximately EUR 7 billion annually that otherwise goes to the road system. The Ministry of Finance is reported as having the ambition to bring about increased fee financing of the road system and would like this, for the parts where it is possible, to be organised outside the federal government balance sheet.

The fee revenues are used to finance projects in the nationwide road network that are managed by the federally owned company VIFG (Verkehrsinfrastruktur finanzierungsgesellschaft mbH). VIFG was formed in 2003 to work with different forms of fee-financed projects on the road network, which have mainly come to be implemented in the form of PPP projects. So far, six projects have been built, two of which are still not fully completed. The intention of the Ministry of Transport is for about two such projects to be implemented in the near future. Recently, it has announced its intention to offer interested actors to the chance to bid for a further six projects of this kind.

These projects mainly consist of adding additional lanes to existing motorways. In some cases, this has also involved bridge construction. It is generally distances of 50-70 km that are undergoing reconstruction in this manner. The term of the agreements is approximately 30 years. The PPP company is responsible for implementation and project financing, while VIFG is responsible for the payment of the annual fee to the PPP companies, based on road user charges for heavy vehicles. This is the project model called the “A model”, in which the government retains ultimate responsibility for the projects.

The experience from these projects is that they inject innovation and renewal in working methods and the organisation of major projects that are beneficial to the German road sector. It is also believed that it has been possible to shorten construction times compared with publicly run projects and that quality has been maintained at a high level. The quality of the projects is perceived to be good, partly due to the projects adopting life cycle costing, something which the government has not done to the same extent as the private PPP companies.

There is also the opportunity to use a model called the “F model”, where a more extensive private responsibility for PPP-

financed projects can be pursued. So far, two such projects have been implemented, in northern Germany. These relate to tunnel projects. A relatively large proportion of financing from the public sector has also been used in these projects. Both the projects have needed to be renegotiated after completion partly because traffic forecasts for the projects turned out to be too optimistic. There is also a view that the two cases in question were not the best choice of projects for testing PPP financing, but were projects that had an inferior forecasted profitability compared to other projects. For this reason, several interviewees believe that these projects had inferior conditions for achieving success than other projects.

3.5 Denmark

General

The nationwide road network in Denmark is owned by the Danish government with Vejdirektoratet (the Danish Road Directorate) as the managing authority. Municipalities own streets and minor roads. Also among the major road administrations are the “bridge companies”, for example those for the Öresund Bridge and the Great Belt Fixed Link. These companies are owned by the Danish government.

The government agency, Banedanmark, is responsible for the nationwide railroad infrastructure. A number of regional actors are responsible for certain supplementary railroad infrastructure, while the Öresund Bridge Consortium is responsible for the Öresund Bridge's railroad (half of which in turn is owned by the Danish government). In addition, Copenhagen has Metroselskabet I/S, which is owned by the municipalities of Copenhagen and Frederiksberg and by the Danish government. The company operates the underground system, Metroen.

In 2009, seven of the Danish Parliament's parties entered a long-term agreement on transport policy, entitled “A Green transport policy”. This agreement created a separate “account” in the Danish government budget of DKK 97 billion to be used for investments in various transport modes until 2020. The advantage of this solution is the achievement of a long-term view for financing and the ability to avoid short-term savings in the budget for transport infrastructure investments.

Alternative financing

The financing of roads and railroads primarily takes place through government and municipal grants based on fuel and vehicle taxes and on general tax revenues. Direct user charges are virtually non-existent in the road network, while some user charges exist for companies using the government railroad network. Unlike these principles, the major bridges are financed through fees, mainly from car traffic. Because they are run as limited companies, there is also a requirement for full cost coverage for these parts of the road and railroad networks.

The new government in Denmark has initiated work on a strategy that aims to establish a long-term development framework for railroads and roads. A progress report from December 2011 (Ministry of Transport, 2011) indicates three significant areas for future work; the road and railroad networks in Jutland, links between various parts of the country (including a new Kattegat link) as well as public transport and ring roads in the Copenhagen area. The expansion and strengthening of public transport is a priority target in general.

One of the objectives of the parliamentary agreement from 2009 was to consider the introduction of a kilometre-based road user charge/tax model. However, this objective has been postponed, partly because of weaknesses in the technology that was to be used and partly because of a lack of political support for such a model. Another ambition of the new government expressed in autumn 2011 was the introduction of congestion charges in the road system in the Copenhagen region. Relatively extensive investigation, in part by the Danish Road Directorate, has been performed into this matter.

A report containing an environmental impact assessment of such a system was presented as recently as January 2012. The government has subsequently announced that it intends not to implement this proposal. One of the reasons was that the new majority did not see it as possible to find a model that provided a good control effect on different road user groups. On 1 March 2012, the government and some of the opposition parties entered an agreement that would instead worsen the tax bias for, e.g., car leasing and use the increased tax revenues to raise the subsidisation of public transport in order to reduce user charges. In addition, a Commissioner will be appointed to investigate how the congestion

situation in places such as Copenhagen is to be managed. The kilometre taxation of heavy vehicle traffic and the previously planned system of kilometre-based charges/taxes for all car traffic will also be investigated again.

For the major projects planned in Copenhagen (Ring Roads 4 and 5 west of Copenhagen and Ring Road East) and for a new Kattegat link, fee financing is still stated to be one of the primary alternatives. These projects would cost about DKK 130-150 billion to implement, which is around half the volume of projects discussed in the 2011 strategy document from the Ministry of Transport mentioned above.

The Danish government announced in early March 2013 that it intends to establish another transport infrastructure fund to be used for railroad expansions. The fund will cover about DKK 27 billion and be financed by an additional tax on companies in the Danish oil industry. There is still no detailed information about the Fund's structure, but it does constitute another example of a special fund of resources for transport infrastructure in Denmark that is separate from the rest of the government budget.

It may be noted that Denmark is not discussing PPP projects in the area of transport. At the same time, the large element of fee-financed projects in the road network has entailed transport infrastructure becoming broadly divided into two parts. One part is financed by a traditional tax model, while a new part of roughly the same size from an investment standpoint is financed by fees. Through this, Denmark is one of the countries where fees of various kinds are used to an unusually great extent. It does not appear that this overall picture will be altered by the decision to refrain from congestion taxes in Copenhagen.

3.6 Norway

General

In Norway, the responsibility for national roads rests with Statens Vegvesen (the Norwegian Public Roads Administration), a government agency that is divided into five regions and is under the management of the Directorate of Public Roads. Railroads are essentially managed by Jernbaneverket (the Norwegian National Rail Administration). In addition, the government owns the

railroad company NSB, which manages parts of the infrastructure in the railroad sector, such as stations.

Extensive changes have been made in recent years in Norway, both in terms of the geographical responsibility for the road network and of the financing of road infrastructure in particular.

From 2010, as part of a major public sector administrative reform, the responsibility for the road system has undergone significant changes. In the first instance, a major transfer of former national roads to the 19 counties has been carried out. The road network (Riksveger) that is directly managed by Statens Vegvesen was thereby reduced to about 10,200 km, while the counties are responsible for approximately 44,500 km of road (Fylkesveger). The municipalities are responsible for approximately 38,000 km of roads.

In conjunction with the reform, it was investigated whether the counties would build up their own road expertise and administration. However, for reasons of preserving expertise and for keeping the administration of roads reasonably integrated, it was concluded that it would be appropriate for the counties to instead order services from the five regions within Statens Vegvesen. The counties do have the opportunity to perform more of the planning and operations themselves if deemed appropriate, and this has been the case in a few instances. However, the predominant picture is that Statens Vegvesen has had two clients for its activities since 2010; the government and the counties. The relationship between the counties and Statens Vegvesen is governed by an agreement that specifies various measures. There is a specific consultation organisation for the overall coordination with the counties.

In conjunction with the reform, government appropriations for construction, operation and maintenance were transferred to the counties. About NOK 7 billion per year are transferred to the counties in this way. This represents an increase of around NOK 1 billion per year compared with the previous level. At the same time, there is discussion about whether the road network in question was “behind on maintenance” when it was transferred. Overcompensation during the transfer of responsibility to the counties was to some extent intended to meet the criticism that existed of the counties being allowed to assume responsibility for assets that were considered to have major maintenance needs. A survey of the standard of the county and municipal road networks

is in progress as part of efforts to ensure proper uniform standards, but also to address the question of whether the county roads can be considered to have been behind on maintenance, and if so to what extent.

The funds transferred to the counties are not formally earmarked for road purposes. However, Statens Vegvesen's assessment is that the counties have chosen to use almost all the allocated funds on roads.

The counties also have borrowing rights with the government for road matters amounting to NOK 2 billion per year. These loans can be used for new construction. The loans are interest-free, but are subject to amortisation by the counties, through road toll revenues, for example.

Statens Vegvesen's responsibility for road operation and maintenance is decentralised to a relatively large extent. However, an assessment from the Directorate of Statens Vegvesen is that the central coordination within the organisation has been enhanced since the counties took over a large part of the road network. The Directorate conducts regular follow-ups with the regions to monitor their work with operation, maintenance and investments.

An essential part of the continued coordination of the road administration is also that it is Statens Vegvesen which is responsible for investment activities. Regardless of whether it is the government itself, through Statens Vegvesen, the counties or (see below) Bompengeselskaper that finance new construction, it is the NPRA that is responsible for the implementation of the investment objects. As in many other countries, Statens Vegvesen does not have its own organisation for carrying out maintenance and investments, but these are procured from external contractors.

Bompenge financing at the regional and local levels

Norway has a long tradition of toll (Bompenge) financing. However, from 1912 until 1985, it was virtually only the government was responsible for the financing of roads in Norway³. From 1985 onwards, however, the possibility has existed for municipalities and counties to form what are known as Bompenge projects which have enabled a locally initiated project with links to

³ This section is based in part on "Norske bilavgifter - NAFs innspill til et helhetlig avgiftssystem" Norsk Automobil-Forbund, February 2011.

nationwide road planning to be implemented with toll financing. A limited company has usually been formed to provide for the financing and operation of the road toll system over the 15 years that the projects generally cover.

The Norwegian Parliament makes decisions in each individual project, and to be approved, at least 50 per cent of the financing must come from road tolls. Other financing generally comes from grants from the government and the counties. Economic calculations are also to be made as a basis for the implementation of the projects. However, according to assessments from several interviewees, it appears that the economic calculations associated with these projects are not always of decisive significance for implementation. One possible interpretation is that the local political interest in bringing about the projects and the requirement for borrowings in the balance sheet of the Bompengeselskap (toll company) to be paid off within 15 years gives an approximation of full cost coverage for the investment.

The investment is also carried out by Statens Vegvesen for these projects, and the government is normally also responsible for the operation and maintenance of the facilities once in use. These Bompenge projects may be considered to represent a form of co-financing between the government, regional and local interests and road users.

There are now around 50 Bompenge projects, and their scope has increased rapidly during the 2000s. Nowadays, the annual financing made available through this financing is of about the same magnitude as that of the government, that is, NOK 6-7 billion per year. In the national transport plan for 2014-2023, these projects will, in the highest frame specified, amount to about NOK 80 billion, that is, approximately NOK 8 billion per year⁴. This is thus substantial financing through direct road user charges that Norway collects in this manner.

The projects have concerned individual projects in the nationwide road network, various ring roads around population centres and more integrated “road packages” in the more heavily used network. With respect to projects in population centres, there are also instances of the use of road tolls to finance public transport investments. The government has stated that the aim should be not to levy higher charges than can be borne by road

⁴ “Anbefalling om regionale bompengeselskaper” Rapport 5. September 2012, Statens Vegvesen (Norwegian Public Roads Administration).

users without reducing the use of the road. Therefore, according to this view, it should primarily be a matter of employing road tolls on more heavily used sections of road. However, this is a principle that is not always followed in practice.

No overall evaluation of the Bompente projects has been made in Norway. One advantage that Statens Vegvesen has seen is that it has been possible to secure effective financing for these projects through the construction phase. This is in contrast to several other projects where financing has sometimes been short-term on the part of the government, something which has led to less rational construction processes, with unplanned stoppages and reorganisations of resources as a common element.

At the same time, there has been a picture of the administration of the Bompengeselskap having become too extensive and expensive. For this reason, on the initiative of the government, Statens Vegvesen has produced an investigation that proposes a coordination of all Bompente projects in regions that may cover several counties. However, the “benefit principle” is also to be maintained in this regime. It means that there may not be any cross-subsidisation between different projects. Users of the particular road sections shall also pay the full cost of the project.

The proposal to coordinate the Bompengeselskap has met with criticism, in part from Norvegfinans, which is an interest association for these toll companies. Norvegfinans believes that the investigation ignored the proximity between users and the Bompengeselskap which contributes to increased efficiency in, for example, the operation of the road sections. According to Norvegfinans, a realignment of this kind into larger regional units risks leading to a weakening of this link between the users and the road financing organisation. Some criticism is also discernible in these views of Statens Vegvesen's manner of managing operations and maintenance.

NAF (Norsk Automobil-Forbund) takes the view that Bompente financing should be seen as part of the big picture of road financing. Furthermore, it argues on the one hand that it is essential to take the “benefit principle” into account, and on the other hand that the public sector (mainly government) must have a prominent role as financier and decision maker. There appears here to be a contrasting combination of an interest in promoting locally initiated expansion projects through the possibility of Bompente and concerns that user financing could lead to undesirable

diversion of traffic from the roads. Operation and maintenance should therefore, according to NAF, be considered a public good that should not be subject to charge.

PPP projects

Norway has implemented three road projects with a PPP model. These relate to three projects on road E39 and on road E18. The projects have covered a total of between 17.5 and 38 km. The financiers were the Nordic Investment Bank (NIB), private banks and, in two cases, the EIB. There were various contractors, the larger being Skanska, Veidekke and Bilfinger Berger. The planning of the projects is closely coordinated with Statens Vegvesen with respect to their placing in the nationwide road network. The Norwegian Parliament has also made the final decisions on the implementation of the projects.

The agreement period for the PPP projects is 25 years, which means they will run until between 2030 and 2034. The model applied is one of availability-based compensation. This means that the operator of the road takes a limited market risk, that is, the risk that traffic shows a negative deviation compared with the traffic prognosis. The government instead takes the risk and covers any difference between the toll revenues collected on the road section and the prognosis made. The operator of the road also receives compensation for the extra operational cost arising if the traffic volume is higher than forecasted.

An evaluation conducted by the Institute of Transport Economics (TÖI) and Dovre International AS on behalf of the Ministry of Transport and Communications (TÖI, 2007) sees several positive experiences of the PPP model. A significant one is believed to be a shorter construction time that yields a lower cost of capital. A greater focus on life-cycle costs is reported to be another positive effect, as is a high degree of innovation in the construction process. The report also indicates that the difference in financing cost between public and private financing, which in e.g. Sweden is commonly cited by the government as a reason to refrain from PPP solutions, is not a relevant argument from a welfare economic perspective. The opportunity for project efficiency gains that PPP solutions provide in comparison with

publicly run projects also needs to be weighed in favour of PPP projects.

The report reflects a positive view of the projects from actors at the local level and among suppliers. Continuous evaluation of the projects by banks and other financiers is one of the stronger reasons for achieving efficient progress in construction projects and ongoing maintenance. The latter, according to the report, is difficult to achieve in other forms of operation with public financing. Finally, it is also stressed that at the same time, different forms of toll financing often risk resulting in an economically unfavourable effect. For this reason, careful consideration must be given, for example, to the diversion effects to which such financing may lead. It may be concluded that despite a generally positive view of these projects from several parties, the current government has chosen to refrain from further PPP projects, something which the opposition, however, has expressed interested in resuming.

Railroads

The railroad system in Norway is vertically disintegrated since the division of the former Norwegian State Railways in 1996 into two parts, Jernbaneverket (the Norwegian National Rail Administration) and NSB AS. Jernbaneverket is an agency under the government. The agency manages railroads including platforms and stations built after 1996. NSB AS manages other stations and there operates development of station areas and related services.

Jernbaneverket distributes capacity on the railroad network to the operators that apply for this. At present, there are 13 operators providing transport services on the Norwegian railroad network. Activities are almost exclusively financed by appropriations of approximately NOK 5 billion in operating budget and around NOK 4 billion for investments. Operating revenues are of a very limited extent in the financing of Jernbaneverket.

An investigation has been presented by Jernbaneverket on the building of high-speed railroads in Norway. The investigation was performed by commission of the Ministry of Transport and Communications in 2010 and was presented in 2012 (Jernbaneverket, 2012). The report has studied six possible corridors for high-speed railroads with several different options; lines with only passenger transport and with mixed traffic, options

with 250 km/hour and 330 km/hour. The lines extend from Oslo to the West, North, East and South and mean the possible realisation of the 'Nordic Triangle', with connections to Göteborg/Copenhagen and to Stockholm.

The total investment cost in the event that all lines are built with a higher speed standard is estimated to be around NOK 600 billion, which is obviously a very high cost, given the relatively limited passenger flows. All the studied alternatives are economically unprofitable, even if the depreciation periods are extended beyond what is normally applied in Norway and even if the cost of capital is set lower than normal.

Market analyses presented suggest that some of the projects could conceivably bear their own operating costs with ticket revenues from passengers. The main focus of the report is precisely passenger transport. It is not completely clear what effects the expansion outlined in the investigation would have on the freight transport market.

The investigation was prepared as a basis for the forthcoming national transport plan. The government has announced that it intends to return to the investigation's proposals and submit its comments in spring 2013.

In conjunction with the discussion of the perceived needs of strengthening Norway's railroad infrastructure in particular, a discussion has arisen as to whether it would be possible and conceivable to use parts of the proceeds of the Norwegian government's "Oil Fund" (Statens pensjonsfond utland) for investments in transport infrastructure, such as high-speed railroads. Several of those who have put forward this view have argued that it should be reasonable for the government to be able to invest in (economically viable) infrastructure objects in Norway, just as it does in government securities from other countries, with lower real yield, or in infrastructure-related assets in other countries.

Such redistributions of oil fund investments from overseas holdings to domestic holdings and from direct yield investments to more indirect yield asset classes will naturally require careful analysis with respect to the macroeconomic effects. There is, for example, reason to fear that such repositioning could lead to an undesirable monetary expansion that, if it were to be sterilised by the central bank, may crowd out other investment areas. Otherwise, the risk would be great that inflationary tendencies

would be appreciable. It remains to be seen how this discussion will be continued. In summary, it is unclear whether the discussion on the Oil Fund's investments will change in the manner proposed, with scope for investments in domestic infrastructure projects. However, the discussion can be seen as an expression of interest in finding forms for alternative sources of finance for transport infrastructure investments, where long-term capital investors can play a greater role in the future.

3.7 Finland

General

In Finland, the Finnish Transport Agency, under the Ministry of Transport and Communications, is responsible for roads and railroads at the national level. The municipalities are responsible for the municipal road network. In addition, there is a large network of private roads, as in Sweden, for example. The government is responsible for almost the entire railroad network, except Helsinki's tram and metro systems, which are operated by the Helsinki Regional Transport Authority (HSL). Fuel and vehicle taxation is the predominant source of financing for the government, which finances roads and railroads at the national level through appropriations.

In the guidelines document for transport policy and the development of the transport system presented in 2008 (Kommunikationsministeriet, 2008), the government established that there was a significant need to increase maintenance efforts both on roads and on railroads. Several major road, railroad and metro projects are part of the plan, which includes both rebuilding and new construction. Another project, mentioned in the longer term, is the establishment of a new airport in Helsinki. This is a project that needs to be commenced in the coming years, with an implementation perspective of 10-15 years, according to the plan.

The plan also discusses various forms of alternative future financing for roads and railroads. There are, for example, discussions of various changes to the government's internal management of infrastructure investments, with proposals for introducing a capital budget to distribute the costs of these investments over time. Another alternative is the creation of a

special “fund” for transport infrastructure within the government budget framework, in keeping with the Danish solution.

Other alternative forms of financing being put forward are the municipal co-financing of individual projects, road user charges of various kinds and a greater focus on life cycle costing through PPP projects. The report proposes that 2-3 of these projects, with a budget of EUR 100-150 million, be started during a government’s term of office. For cross-border projects, EU financing of various kinds has been used, such as via TEN grants, but EIB loans are also a form that is mentioned. In addition, there are loans from the Nordic Investment Bank (NIB).

PPP projects and alternative financing

The PPP model has also been used in Finland for three major road projects. The first was carried out in the 1990s, a second in 2005-08. The third relates to a section of the E18 eastwards from Helsinki. The project covers 53 km of new motorway and a number of connections, etc. The project cost amounts to EUR 623 million, and the PPP project runs until 2026. The project company is responsible for the planning, construction, financing and maintenance of the road until 2026, when the road will be handed to the Finnish government. The Finnish Transport Agency (Trafikverket) is the client. A larger number of financiers and borrowers are part of the PPP structure in accordance with a standard model for such projects. The company Meridiam is behind the design and also owns part of the service company that will build the road. Otherwise, it is pension funds etc. that are participating as financiers.

PPP projects in Finland have a structure in which the government pays shadow tolls or other forms of compensation to the PPP company. There are no direct road tolls in these projects.

The Finnish Government has also attempted to arrange a PPP solution for a major railroad project in Ostrobothnia. According to information from the Ministry of Transport and Communications, three tenders were received in the procurement that was conducted. However, the price level/conditions were perceived as unfavourable to the government, and the project is now instead being built with traditional government financing. One explanation for the unfavourable price level may have been that the government

transferred too much risk to the PPP project in the model that was tested in the procurement. This is a situation which may lead to unfavourable prices for the government/contracting entity or to the PPP structure not having become financially sustainable over time.

Since autumn 2011, Finland's new government has, in keeping with the statement of government policy, continued work on long-term planning in accordance with the method in the previous government's strategic plan. Several different financing models are being tested, and a new strategic plan has been prepared and sent for consultation. A final version will be presented to the Finnish Parliament in April 2012. As part of this work, a special government committee has been appointed to investigate the introduction of a PPP-based road user charge system to replace the current fuel-based tax system. The committee is led by Nokia's former CEO, Jorma Ollila. It is to complete its work no later than December 2013.

A system of congestion charges in Helsinki has been investigated. However, no decision on its introduction has yet been made.

In conclusion, Finland has embarked upon a road where a variety of alternative forms of financing and operation are being tested for the maintenance of existing infrastructure and for new construction. A transition to an advanced distance-based charging system could take Finland to the forefront internationally with respect to efficiency and the financing of transport infrastructure.

3.8 Sweden

General

Since the 1940s, the government has been responsible for the nationwide road and railroad networks in Sweden. Alongside the government, roads and railroads are managed and owned to various extents by county councils, municipalities, private enterprises and individual households. The government and municipal road network covers about 140,000 km, of which the government has close to 90,000 km.

From having been activities operated according to a centralised and sectorised organisation principle from the post-Second World War period until the 1980s, a regional influence and an intermodal

perspective have become more explicit. There has thus been a transfer of responsibility and influence regarding infrastructure planning to regions/counties and to municipalities over the last 20-30 years.

The management of roads and railroads on the part of the government takes place through a variety of measures. The government sets up the general rules and regulations for the construction and expansion of the road and railroad systems. Furthermore, the financing of the national systems is managed, and this management is exercised through ownership of the systems.

For both road and railroads, a change has taken place over the last 20 years whereby the government has disposed of the main parts of the resources within construction, engineering and maintenance. Remaining under government management are the resources to procure, project manage and control major projects and maintenance. This has resulted in a new organisational design of the road and railroad authorities, which were merged into the new Swedish Transport Administration (Trafikverket) in 2010.

In 2011-2012, the Swedish National Audit Office (Riksrevisionen) performed a number of audits on the organisation and financing of transport infrastructure. A report from December 2012 presents the audit concerning the government's control of investments in transport infrastructure. In summary, the Swedish National Audit Office criticised the planning of infrastructure investments as not being in accordance with the transport policy principles of effective choice of measures, which means that the construction of new infrastructure is to be the measure implemented only after other alternatives have been considered. It was also pointed out that transport is often underpriced in relation to its variable costs and that the decision-making documents contain overestimated benefits and underestimated costs. Overall, this leads to excessively positive economic calculations that show overly large benefits for various measures. This is a criticism of the use of economic decision-making documents that has been stated on previous occasions, see for example Hasselgren and Fogelström (1990).

Roads

The government owns, finances and manages the nationwide road network that covers motorways, national roads, but also a relatively large part of the more fine-meshed road network outside the cities. Municipalities own, manage and finance the other roads that are not owned by local road associations and private enterprises, for example, forest roads.

The financing of the public road network held by the government and municipalities is dominated by appropriation funds. Only to a lesser extent has alternative financing in the form of road user charges been introduced. Previous systems with kilometre-based taxes for certain vehicle traffic have also been dismantled. Charges are now mainly applied for some bridge projects (the Öresund Bridge and the Svinesund Bridge) and for congestion taxes in Stockholm and Göteborg. However, plans are underway to also introduce charges for some projects in the national road network.

Railroads

Since 1989, the government railroad network is separate from the government railroad operator SJ, from which freight transport operations and other support activities have also been separated. In addition to the government railroad network, managed by the government through the Swedish Transport Administration, there are regional and local rail systems used primarily for passenger transport. There is a smaller number of privately managed rail systems for transport within and for intermodal terminals and for individual industries.

One more extensive project in PPP form has been implemented for railroads. This is the Arlanda Line, owned by the government via Arlandabanan Infrastructure AB, a limited company wholly owned by the government. The traffic rights will be held until the year 2040 by A-train AB, which pays annual concession fees corresponding to about 2.5 per cent of the original investment cost for the line, approximately SEK 57 million per year. The railway's original investment cost will thus have been repaid over the 40-year concession period.

Planning is underway for the development of supplementary railroad infrastructure for the nationwide network. At an earlier stage, there was a discussion about building a high-speed railway. The government, however, has recently stated that it now intends to proceed with building new railroads based on more conventional technology. The planning for several sections with this technology has now been commenced. The speed standard that will ultimately be chosen for the first parts of this network is not yet clear.

Alternative financing

As mentioned above, the proportion of alternative financing, alongside tax financing, is relatively limited in Sweden. However, that which has been considered as a supplement to traditional government appropriations financing is to invite municipalities and regions to collaborate with the government on the financing of individual projects through co-financing. In these projects, the government and municipalities/regions pool the available funds in order to achieve a better overall project, for example, with respect to railroad stations or projects that are important for an individual municipality, but maybe not for the government.

The intention is that projects coming under consideration for this co-financing are to be subject to the same requirements of economic calculation as projects solely financed with government financing. They are also to be incorporated in the overall action plan for infrastructure measures. The reasons for this are that municipalities and regions with a strong economy will not be able to 'use money to jump the queue' in the form of their own investments and that the net economic profitability of the projects will not be overridden.

It is difficult to form a clear picture of whether co-financing has led to positive or negative consequences overall. A number of projects appear to have been planned in a way that might be better than with the usual planning models, for example, with respect to reconciliation with municipal plans. At the same time, there is a widespread view that co-financing has nevertheless opened the door to certain possibilities for some municipalities and regions to jump the queue. In 2011, the Swedish National Audit Office audited co-financing and concurred with the critical comments that, among other things, co-financing leads to unclear priorities

and possibly also to inferior resource utilisation overall. In a bill in autumn 2012, the government proposed measures to prevent any such possibilities.

3.9 Summary impressions

One observation from a majority of the countries is that the government road network has a smaller (relative) scope in most other countries than in Sweden. It is true that the countries are different in size and few countries are as sparsely populated as Sweden, which may explain the government having a larger proportion of the road network than in other countries. However, even taking these factors into account, the government's road network in Sweden appears to be extensive.

In a large number of different models, the comparison shows how organisation and financing are designed and the arguments used for various measures. A clear trend, however, is that most countries have opened the way for testing the PPP model. It is largely only Sweden and Denmark which have not done so. Denmark, however, has been more open to running its major projects with user financing. The overall impression is that the changes and measures regarding the development of organisations and financing have been greater in most other countries.

One circumstance not made clear in this comparison is the financial balance that prevails in the different countries' transport infrastructure systems. A general observation here is that the United States has a weakly financed federal road system, while several European countries have higher taxes on fuel and vehicles and thus a better financial balance. The reverse can possibly be said to apply to the national railroad networks, where railroads in the United States are dominated by freight transport, which, in principle, is self-financing. Europe has a higher proportion of passenger transport, and the deficits in railroad operations are greater.

4 Theory and practice in the discussion on organisation and financing of transport infrastructure

There is an extensive academic literature relating to issues relevant to a discussion of the organisation and financing of transport infrastructure. Here, a treatment is provided of two such theoretical areas that have often had great scope in the Swedish debate and in international contexts. These relate to economic theory and its application to large technological systems, such as roads and railroads, and to theory formation regarding the planning and resource management of these systems so as to achieve sound resource utilisation.

4.1 Efficiency and economic theory

Large technological systems, such as roads and railroads, are characterised by the asset mass being built up over a long period of time through new investments and reinvestments in the total network. Roads and railroads have a relatively long life span, but do not have any great alternative value, with the possible exception of copper wire used in the power supply for electrified railroads as well as the material in the rails themselves.

Based on economic theory, the investments made in the systems can therefore be viewed as “sunk costs”, that have no (significant) alternative value. The transport operations carried out in the road and railroad networks should, in this approach, be able to be priced according to the short-term marginal cost, that is, mainly the variable cost. If a welfare economic approach is applied, prices or

taxes should be set that are equivalent to the short-term social marginal cost. Where congestion exists, it can be demonstrated that charges set according to the principle of short-term economic marginal cost (which covers compensation for the externalities to which traffic gives rise, including congestion/time cost) result in it being possible for the total costs of roads and railroads to be covered with marginal cost pricing. Naturally, this only applies to relatively few places in a country like Sweden, where congestion is largely an exception in the road network, but more common in the railroad network.

It is not possible to expand and maintain multiple competing and nationwide road and railroad systems while maintaining sound resource utilisation in the economy as a whole. Such a system would lead to a low capacity utilisation and high costs per unit of transport. It is possible here that exceptions exist on certain sections and that there are routes where the traffic volume is high, mainly in the major cities. However, a purely geographical lack of sufficient land on such routes typically prevents the establishment of multiple competing systems in the places where traffic volume would justify this.

These conditions characterising road and railroad systems have often been discussed under the heading of “natural monopolies”. By this is meant that roads and railroads are technological systems that cannot reasonably be provided in market-like forms and where a market model for their provision may be expected to result in only one or a few suppliers in the market. A common notion in such systems is that monopoly actors in the private sector can be expected to set prices that exceed the price that would be achieved in competition (i.e. near the short-term marginal cost) and that there are tendencies for monopoly actors to ration the supply of capacity below a level that is economically efficient.

Situations with these “natural monopoly” tendencies have often been met with standard organisational and financial solutions, often with government involvement. Viewed in a longer perspective, it may be noted that the concept of natural monopoly was introduced by Malthus and J S Mill in the first decades of the 19th century. See Mosca (2008) for a broad overview of the concept's historical emergence. The element of natural monopolies has traditionally been discussed with respect to lighthouses and fairways and later railroads, but is used today as a metaphor for large parts of the transport sector.

In a more modern tradition of economic theory, analysis based on a hypothetical dichotomy between a market sector and a regulated or public sector in the economy has been dominant. This view is most clearly attributable to Samuelson (1954, 1955), who in the mid-1950s published two articles that analyse the economy as divided into this very dichotomy of private and collective (or public) goods. According to this tradition of theory, collective goods are characterised by low excludability, limited rivalry and the existence of externalities, which may be both negative and positive. This means that it can be difficult to bring about market solutions, partly because it has often been difficult to charge for these products or services.

For private goods, the reverse is true, that is, there is a rivalry regarding use; users and customers can in effect be excluded, and the externalities are few or insignificant, or they can be included in the pricing of the goods or services in question. This makes it possible to organise customer-financed market solutions.

On the one hand, it is possible to link to this theory formation a welfare-theoretical tradition represented, inter alia, by Pigou, who introduced the modern view that efficiency could be raised by the public sector providing subsidies of various kinds in order to secure the supply of public goods, for example, transport infrastructure, in the event these are not made available on the market. On the other hand, Coase may be cited as a theorist who stressed the value of an institutional perspective where the organisational solution for providing systems such as transport infrastructure should be in focus and where doubts are expressed as to the adverse effects on economic efficiency that government subsidies to transport infrastructure may have.

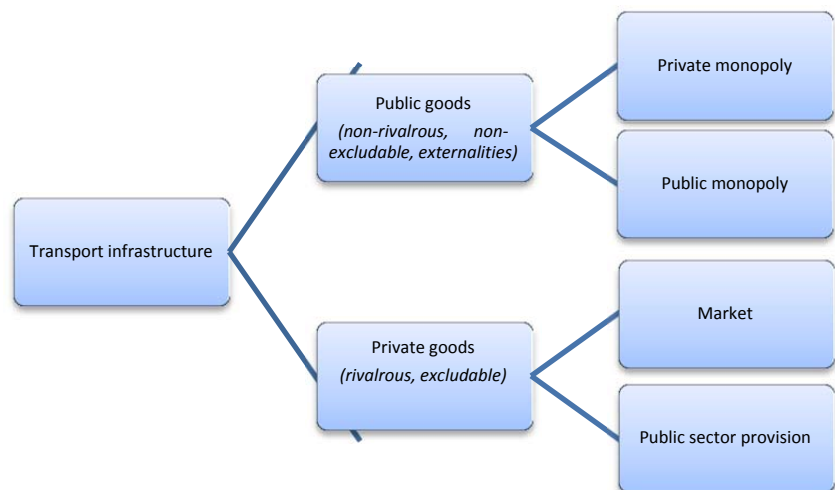
The view on the financing of transport infrastructure has varied over time and between different economic approaches. One view, represented, inter alia, by Pigou, is that deficits often (but not always) arising if pricing is set to the short-term social marginal cost should be covered by general tax revenues and that the tax revenues from fuel and vehicles should not be seen as especially destined for roads or railroads in particular. A main issue then becomes how taxes and fees in general should be designed in order to give as small distortions as possible, known as optimal taxation.

Another view is that the financing should instead be arranged with fees direct from the users of the services or by taxes from transport being assigned to the financing of the transport system.

A principle of full cost coverage is often associated with this view, which is close to that advocated by Coase. In favour of this approach is the fact that it provides good incentives for efficiency in organisations when they are customer-financed, but also principles of equity in tax systems can be used for these arguments. By linking tax collection to direct benefits or services in the same area, redistribution effects are reduced and there is a closer approximation to the clearer incentives for efficiency expressed, for example, by Wicksell's interpretation of the interest principle⁵.

Services and goods that fall within the two different categories (collective goods and private goods) can be provided by actors either under private or public management, giving a number of alternative forms of organisation as in the figure below. There is an extensive discussion associated with this categorisation regarding cases where market solutions and public-sector solutions lead to situations lacking in efficiency of resource use. Situations where market solutions fail are usually termed “market failures”, while solutions under public management that fail can be termed “policy or public-sector failures”.

Figure 4.1 Private and collective goods, and forms of organisation



⁵ Wicksell's interpretation of the interest principle means that “packages” of expenditure areas in the public budget are directly linked to financing via taxes or fees. The financing should, according to Wicksell, be a result of a political negotiation with the requirement to reach unanimity or at least a high level of consensus. See also Svenskt Näringsliv (The Confederation of Swedish Enterprise) (2009).

Some criticism has been leveled at these lines of reasoning that have such a clear-cut dichotomy as a basis of analysis; see, for example, the overview article by Mosca (2008). Goldin (1977) represents a perspective that calls into question the very foundational concept of something being able to be considered a “natural monopoly”. Is it really the case that consumers cannot be excluded from utilising the services? It is reasonable to assume that the marginal cost of one additional user approaches zero? It is possible for the marginal cost to approach zero in a short-term perspective, but not necessarily when considering the question in the longer term, because capacity expansions can become necessary to meet the demand.

Goldin also points to the fact that it is often possible to design an alternative supply route for services or products provided in collective forms, which allows a market solution. Goldin exemplifies this by saying that roads can be provided with toll systems that shut out users, that traffic gives congestion effects and that there are marginal capacity costs which mean that additional users really do yield additional costs.

Another well-known criticism of the reasoning on natural monopolies, which has a direct bearing on the transport sector, is Coase's article (1974) on the existence of market solutions in the provision of lighthouse and fairway services in England in the 19th (and 20th) centuries. It turns out that these services had long been able to be offered financed with fees from users, in this case from vessel operators.

A way of bringing together the discussions on systems such as transport infrastructure, and whether they should be seen as part of a public or a private sphere of society, is offered by Wagner (2007). Wagner argues that there are good reasons for both approaches. Whether a system is to be deemed most attributable to a private or public sphere can, argues Wagner, be considered dependent on which issues one chooses to focus. If the question is seen from welfare theory and the starting point of distribution, it may be concluded that it is issues such as setting prices/taxes according to the social marginal cost and arranging any deficit financing in the best manner, among others things, through a tax system with as few distortions as possible, that are in focus for achieving efficiency.

If the question is seen from a market perspective, the conclusion can readily be drawn that the main shortcomings in efficiency do not lie in the private sector and in any monopolistic tendencies, but instead in the public sector's inability to manage decision-making processes and financing issues in an optimal manner. This latter perspective also generally underlines the importance of innovation and dynamic development in private market solutions.

Wagner's conclusion is that the dichotomy of public/private services essentially lacks any stronger explanatory value in order to come closer to an objective view on these questions. Wagner, for his part, sees this as an example of when a balance between the different perspectives needs to be sought in order to arrive at a model that provides efficiency and legitimacy to several different objectives. With this approach, one of the ultimate objectives may be considered to be the achievement of "good governance", which entails a view of public/political-democratic processes as dynamic processes without a clear goal, but also where a measure of basic moral and ethical discussion needs to be present. The market risks opening the door to an excessively strong self-interest, while public systems risk drifting into situations with excessively strong hierarchical, top-down structures. Searching for institutional models suitable for managing these conflicting tendencies is an essential part of the search for good governance of this kind.

Here, Wagner's reasoning is parallel to, e.g., Mark Pennington (2011), who has recently presented an analysis of similar issues in modern Western societies, which seeks long-term robust societal structures to balance self-interest and public interest. In his analyses, Pennington, in keeping with many others in the liberal tradition, often displays a stronger advocacy of market solutions than Wagner, but has otherwise similar reasoning.

Another way to address the issue of the balance between public and private is presented by Sobel (2004). Sobel argues that for public measures to be more efficient than private ones, even when it is a question of what may be considered collective goods and services, it is necessary for public financing not to be distorting or inefficient and for public activities to be more efficient than private activities. After presenting the general welfare-theoretical arguments and the discussion of the shortcomings in the public sector's ability to produce and deliver in an efficient manner, Sobel concludes that the choice mainly stands between whether

potentially inefficient market solutions yield a result that is closer to or further away from an efficient state than potentially inefficient public-sector solutions.

A review of Lindsey (2006) reports how the different perspectives on efficiency and pricing issues, primarily with respect to roads, are reflected in modern research. Lindsey points to the development of the welfare-theoretical approach of which theorists such as Vickrey, Walters and Mohring are examples. Here, pricing and analysis of a welfare economics orientation is in focus. Small, Winston and Evans are other examples of this focus in the area of transportation economics. The fact that pricing and taxation based on marginal cost may, under certain conditions, provide revenues to cover the costs of both maintenance and investments is a part of the analysis developed by them.

However, according to Lindsey, the more institutionally inspired focus of Coase has not led to a corresponding development of theory. Gabriel Roth, who has written a long series of market-oriented books on road issues, is an exception. Another is Clifford Winston, who has proposed privatisations in the transport infrastructure system in the United States as a means of increasing innovation and productivity.

Among Swedish academics who have treated the area of transport economics, Bohm et al (1974) may be noted as one of those who was early in putting forward an economics-grounded approach to government measures in the area of infrastructure. Hultkrantz and Nilsson (2004/08) have used a welfare economic perspective to describe the design and use of cost benefit analyses as a basis for decision-making. Nilsson (2009) has also treated the issue of alternative forms of providing transport infrastructure, including with PPP solutions. This is one example from a broad production covering many different issues, such as the effects of regulations and deregulations from Hultkrantz and Nilsson.

The review above shows that it is difficult to draw any clear-cut conclusions based on the formation of theories about how road and railroad systems should be organised and financed in order to achieve an efficient use of resources. It rather becomes a question of seeking practical trade-offs on various occasions over time to the trade-offs between economic and political rationality that need to be made. It is probably in the nature of these activities that it is not possible to identify a best solution that fits all situations and times. However, it is important to find a balance between welfare

economic efficiency and business economic or institutional efficiency. Otherwise, there is a risk that changes are implemented that more lead to sub-optimisations than to the higher interest of good resource utilisation in the economy.

4.2 The planning dilemma and planning theory

Besides the question of whether activities such as roads and railroads should be regarded as private or collective goods and thus can be expected to be provided by the private or public sectors, or in hybrid forms with public financing and market forms of supply, there are several dimensions to the complex question of how transport infrastructure should be organised. These relate, among others things, to how a coordination of actors and resources can be brought about in order to achieve good resource management. If effective coordination is to be brought about, it is necessary to have access to information or knowledge of many different circumstances on which various decision makers can take a position.

In a market economy, it is presupposed that this knowledge is spread over a wide variety of actors in that economy. An essential information channel for the actors in the economy is the prices set on goods and services and the relative prices between various goods and services. Access to price information, as well as the aid of the free right to agreements and ownership, enables actors in the market to arrange their relationships to each other so as to achieve sound resource management without the need of coordinated planning. The financing of services and goods provided through market solutions is generally based on voluntary fees paid by customers or users.

The other extreme in the analysis of how good resource utilisation can be brought about is usually represented by the centrally planned economy. This assumes that an actor, generally at the central level of the public sector, is able to have access to information on the demand for various goods and services, and in addition have knowledge about the costs of various goods and services. Based on this knowledge, good resource management can then be achieved by resources being assigned to the areas where they have the greatest use or marginal yield. Public planning

systems are generally associated with financing with tax money or obligatory fees.

This discussion in turn reflects the existence of non-efficient forms of organisation, which in themselves are a sign that coordination in the economy is lacking. This latter represents situations where the concepts of market failure and public-sector failure are applicable.

Here, various theories are available. Classical economic theory often discusses the need for information or knowledge on market conditions etc. as decisive for the achievement of good resource utilisation. The very difficulties of centrally positioned actors to assimilate the information needed to make the necessary assessments and considerations are one of the root causes of the criticism of centralised planning and management systems that has been discussed by many theorists, with Hayek (1944) as a key representative and source of inspiration for the following discussion.

Applications of Hayek's approach advocating spontaneous decentralised market solutions are found, among other places, in Schumpeter (1942) and more recently in Klein (2012), Pennington (2011) and Webster (2002), with various applications of the balance between centralised and decentralised planning in industry, urban planning and transport infrastructure. A common line in this reasoning is that an organisation of the economy and society in forms at the decentralised level, creating scope for spontaneous market-like solutions, generally provides better conditions for achieving sound resource management than central solutions, particularly solutions in the public sector, which are surrounded with weaker incentives for efficiency than private actors, for example, through their basis in tax financing.

Within the theories that have emerged around the area of public finance, there is a grouping of theories usually summarised under the concept of "fiscal federalism". For an overview, see for example Oates, 2005. This theory formation applies much of the thought in modern organisational theory and "public choice" theory to problems of getting organisations and systems in the public sector to function efficiently, because the incentives often distort the relationship between voters, politicians and administration.

Another problem raised is the difficulty of organising public activities at different geographical levels so as to achieve a natural connection between responsibility for the activities and the

financing form. For example, there is the tendency to pass on costs to other levels or units in the public sector, something that has often been noted in the area of transport infrastructure. As a parallel to Samuelson's classic articles from the 1950s on the private/public dichotomy, Tiebout's article from 1956 with a model for how efficiency in local public organisations can be understood and achieved through spontaneous organisation regarding local collective goods provided by, e.g., a municipality, is a starting point for discussion of the choice of organisational level and efficiency. One of the conclusions of the reasoning is that it is important to link responsibility for the activities to the financing form at the various geographical levels in the public sector in order to achieve an efficient use of resources. Identifying forms for this is the focus of much of the discussion within the "fiscal federalism" theory.

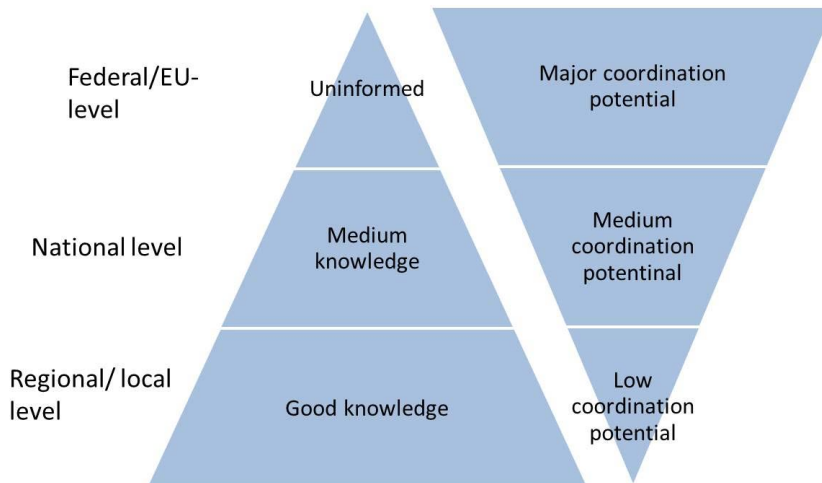
It is interesting to note that Hayek advanced the discussion of the spatial dimension in later writings (Hayek, 1960). There, Hayek points among other things to the fact that public authorities at the local level can often be seen as the next best option to a market solution. The reasons for this are that local authorities are subject to certain competition from other authorities and that they do not generally gain as strong a position in the economy as central authorities tend to gain. However, Hayek points to the fact that in democracies in general, majorities arise consisting of those parts of the voter base that represent the geographical areas with below-average economic development, which will generally result in a majority for the redistribution of income and subsequent creation of centralised planning structures. Here, it can be said that Hayek foreshadowed some of the later developments within public choice theory, but also the theory formation existing within the area of "fiscal federalism".

There are thus (at least) two different perspectives that are relevant to a discussion of how sectors such as transport infrastructure should be organised. The following discusses these different perspectives and combines them into a model with a number of ideal types. We begin, however, with a further discussion of the issue of spatial level and knowledge.

Spatial level and coordination

The figure below depicts three spatial levels; a supranational, a national and a local/regional, which are the three main levels at which transport infrastructure is managed. The highly simplified figure shows that there appears to be somewhat of an inverse relationship between the potential to achieve good resource utilisation through coordination and the access to knowledge and information necessary to achieve such good resource utilisation at different geographical levels.

Figure 4.2 Information and coordination potential at different spatial levels



At a supranational level (e.g. EU level), there is thus a great number of issues that could be coordinated in order to achieve good resource utilisation if access to knowledge was available about all the issues that need to be taken into consideration to achieve good resource allocation. Even if the issues managed at this level are limited to the genuinely transnational, such as Trans-European Networks within the EU (TEN-T), it turns out, however, that the complexity with many different transport modes, a number of cross-border connections and differences in technology and organisation makes coordination very complex.

The measures from the EU tend to focus on both detailed regulation and general measures. The detailed measures can be represented by regulations that risk creating rigidity in the system.

General measures, such as various kinds of corridor-based solutions that create prerequisites for the expansion of roads and railroads or for the management of existing infrastructure are examples of the other extreme, which does not exert much direct control and has an uncertain outcome.

At the national level, the difficulties are similar. Many of the identified problems that need to be resolved, such as the need for better connections across national borders in the Nordic countries, lack resources or institutions to exert influence other than through bilateral or multilateral negotiations. For those issues that could be influenced at the national level, such as the allocation of the nationally available resources to the most urgent projects, it instead turns out that the quantity of information tends to become very great and difficult to manage in terms of time and quality. Centralisation generally leads to a conflict between the unsurveyable quantity of information to be handled in practice and the coordination potential that exists in theory.

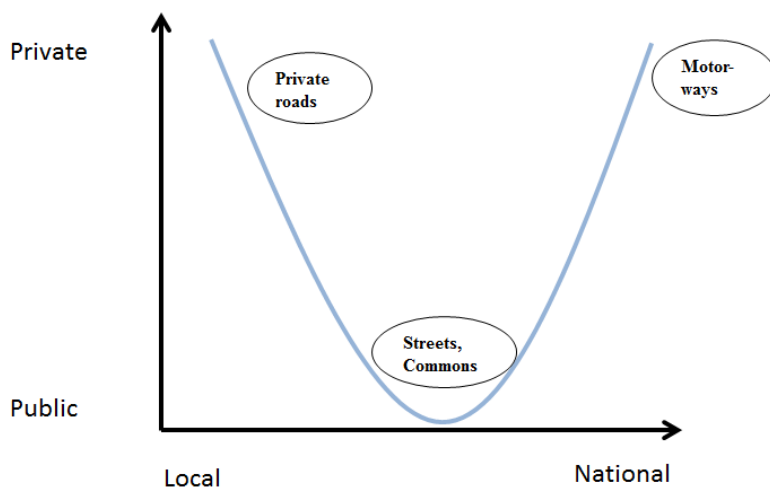
One example is the national investment/action plans in conjunction with decisions on infrastructure measures in the coming years. The plans tend to assume the nature of a political document that is set in various dimensions that do not always have a connection to good resource allocation. The very difficulties of the central administrative level in obtaining sufficient information for being able to perform a rational coordination of available resources have been one of the issues discussed in conjunction with the reorganisation of the transport authorities in Sweden. The present organisation of the Swedish Transport Administration, with both national and regional units that have a role to represent the Administration at the regional and local levels, is an expression of the difficulty in achieving sound resource allocation from centrally located national units. This is a situation accentuated by the relatively extensive road network managed by the Swedish Transport Administration as compared with the government level in many other countries, where in many cases a redistribution between the government and the regional/local levels has taken place.

Finally, at the regional and local levels, there is a better opportunity to acquire knowledge about many of the issues that are essential for the good coordination of roads and railroads. Instead what is missing here is often the opportunity to bring about coordination. The road and railroad systems have a high

degree of network characteristics, which means that decisions on measures often have to be seen in a wider perspective than that of a single municipality or region. Transport solutions in the Stockholm region, for example, are both too costly to be managed by the region and the municipalities themselves and they are generally of importance not only for the region and the local context, but also for interregional and national aspects of the transport network. Therefore, the level with the best knowledge of the facts is where the practical coordination potential is relatively limited.

An alternative way to illustrate the balance between transport infrastructure's affiliation with a private or a collective sphere of the economy, and also the geographical level at which the systems are physically situated, is shown below. The figure is highly schematic and is not intended to provide a more exact basis for describing the nature of transport infrastructure.

Figure 4.3 Schematic view of the road and railroad systems' private and collective nature at different geographical levels



The most local parts of both roads and railroads have few users other than individual property owners or the specific company that constructed a road or railroad and for that reason are of a private nature. Examples of these are local road associations (vägföreningar) and company-owned industrial track. These

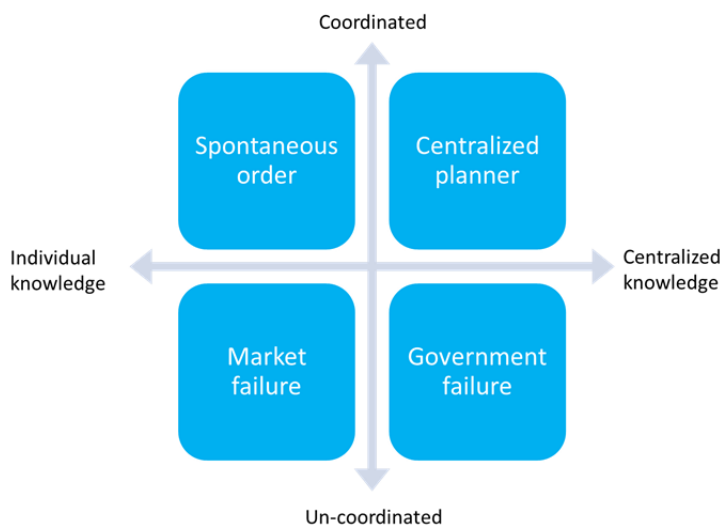
facilities are found on the left side of the figure. At a regional level, the network effects are instead large through the existence of many different potential users of the systems. Examples here might be street networks in the cities and regional roads and railroads. These facilities are found in the part of the figure where the stylised function of the degree of collectiveness/privateness approaches the x-axis.

Moving on to the most central or national in a transport system gives once again the nature of a separable system. These situations are found on the right side of the figure. Although the network aspects in the systems are great, they are at the same time physically relatively easy to separate off and charge for their utilisation, through toll systems, for example. It could possibly be asserted that systems at a supranational level will once again assume a nature of collectiveness through the extensive network externalities.

Ideal models

Below, the two aspects of knowledge and coordination with regard to the planning and management of transport infrastructure are placed against each other, giving four “ideal models” that exemplify various conceivable forms for organising transport infrastructure systems. However, two of these models must be considered more of a deterrent than models to which the economy will aspire.

Figure 4.4 Planning and coordination of transport infrastructure - ideal models



Two “ideal models” with good resource allocation in the economy, for example, for transport infrastructure investments, are exemplified in the upper part of the figure. In the top-right corner is the rational ideal model for good centralised planning, which may generally be assumed to take place in the public sector, and often under public management. At a central level, information is gathered about various needs and measures to resolve deficiencies in relation to clearly measurable goals. These are ranked and decided upon in accordance with the procedures used in the public sector in democracies with political assemblies operating through an executive body and an administration. The financing can be arranged using tax money or using fees, which can normally be expected to be obligatory in nature.

The operation of the infrastructure systems can be arranged either as part of the public sector in government agency form or through organisations operating under forms of private law, but with public regulation. Here, in the case of transport infrastructure, can be found publicly owned companies operated in limited company form with various kinds of price and supply regulation, such as Storstockholms Lokaltrafik AB (SL, the regional public transportation corporation in Stockholm) or Svensk Danska Broförbindelsen AB (Svedab, the Swedish

government owned corporation owning 50 per cent of the Öresund Bridge). There are also various hybrid forms in which publicly owned companies with infrastructure tasks are run with various degrees of competition, such as railroad properties and workshops operated in a government-owned limited company, Jernhusen AB.

The second ideal model, in the top-left corner of the figure above, is represented here by a decentralised market model where many individual actors are in interplay with one another by following their target functions, giving rise to spontaneous coordination. Resources are steered to the most urgent measures and needs through decisions based on current pricing, relative prices and yields on resources invested in different applications. This model does not require any common central plan for how the measures are to be carried out, but sound resource allocation arises as a result of a spontaneous and continuous optimisation process. This model is characterised more by dynamics and constant changes than the centrally planned ideal model, which is characterised more by its tendency to seek equilibrium in each particular situation.

An important prerequisite for the model based on spontaneous coordination being able to function is that the ownership right of private actors is clearly regulated and preserved. In the same way, clear support is necessary for the right to agreements, which is another important cornerstone of this model. In more innovative industries, the importance of a legal mechanism to protect innovations through patent rights is usually also emphasised as an essential prerequisite for the market model. The maintenance of competition through competition-promoting measures and regulation is also an important part of the institutional framework for this ideal model.

It is important to point out that also in the spontaneous coordination model, there is a need for planning of various kinds. Planning takes place, for example, at companies in markets to manage internal business processes, but also to manage external relations. However, what differs between the centralised and decentralised models is that the spontaneous model lacks the ambition and efforts to compile an overall plan to achieve sound resource allocation.

Failures in the public and private sectors

The two models in the lower part of the figure can be said to correspond to the situation in which the economy usually finds itself. Rather than achieving good central coordination, we more often see examples of public-sector failures. For example, actors in the public sector might not succeed in acquiring the information necessary for being able to carry out a rational planning process. It may also be that aspects other than efficient resource utilisation will govern priorities, for example, through political agreements that go beyond what is economically rational, or as a result of the administration and authorities having other priorities than those decided politically.

A common discussion in Sweden and in other countries is also that the planning systems in themselves, with the ambition of reconciling conflicting interests generally expressed by the policy objectives for the systems, lead to difficult trade-offs, lengthy processes and inefficiency. Something usually emphasised is the notion that the various interested parties in planning processes have extensive opportunities to appeal infrastructure-related projects according to several different regulatory frameworks. The interaction between the Planning and Building Act (Plan- och bygglagen) and environmental legislation is usually taken as an example of a lack of efficiency in the planning.

It is, of course, debatable whether consideration, for example, to environmental aspects is to be seen only as an example of failures in the public sector or whether it should be seen as the achievement of coordination between different interests. What is clear in any event is that the coordination of planning processes of this kind often leads to significant time delays and costs. Several investigative efforts have been made in recent years in Sweden to bring about more effective planning processes. This may be seen as an expression of many having perceived the prevailing planning to be characterised by shortcomings and perhaps even “failures”. At the same time, it can of course be said that not all delays incurred in the appeal processes can be seen as failures, but are examples of legitimate complaints about flaws in the investigation of infrastructure measures.

In the management of the infrastructure system, there are several examples of failures. One of the more common examples in economic literature is that the organisation to which the

government has chosen to hand the management assignment does not perform this effectively, maybe, for example, by setting prices that entail monopolistic price setting under public management, or by the activities being inefficient. It may also be a matter of distribution and resource allocation of various kinds in the public sector not functioning, such as the allocation of capacity in the railroad network not being managed in a neutral and effective manner. There are strong reasons here for de-regulation and re-regulation measures that have been implemented for various activities within transport infrastructure.

The management of externalities is another area that can often lead to different types of failure. Either the externalities are not correctly priced, which leads to inefficiency, such as the incorrect choice of transport mode, or the regulation introduced is not correct and instead leads to various distortions in resource utilisation and to the occurrence of inefficiencies other than those to which the externalities themselves lead.

Something that has recently been discussed in Sweden is the discussion about government appropriations for the operation and maintenance of the railroad network having been inadequate. It has, among other things, been expressed in the political debate that this has meant that railroads have not been able to supply transport services of the promised quality, resulting in great losses for travelers/transport purchasers. A related discussion exists with respect to the allocation of appropriations for construction in the road and railroad networks, where it is a common belief, in Sweden and in other countries, that an excessively short-sighted allocation of funds, which may be rational from a government finance perspective, does not lead to good efficiency in the implementation of construction projects. Short-sightedness in construction can, for example, lead to machinery not being able to be used effectively or to construction sites having to be opened and left several times during a project, leading to extensive adjustment time and increased resource consumption.

Market failures of various kinds have been defined and described in many different areas of theory. On the one hand, they can arise if the institutional framework is in some way deficient so that the conditions for an effective market are not achieved. This may relate to shortcomings in the right to ownership or agreements that entail the lack of the necessary basis for the actors' operations. The uncertainty about the opportunities to control assets and the lack

of clarity about the legal effect of spontaneous agreements can lead to high transaction costs or render agreements completely impossible. A lack of protection for innovations through patent legislation can lead to a slower pace of innovation due to a reduction in the return on innovations.

On the other hand, market failures may have their causes in the market not having the conditions to function effectively through restrictions on competition. Maybe there are entry barriers or obstacles to competition that serve to inhibit the potential developmental capacity in the market. An explanation for failures may be that economies of scale lead to actors becoming few in number and thus artificially high prices in the market. In certain cases, deficiencies in technology can make it difficult to arrange markets because the services produced are not characterised by exclusivity and rivalry, and perhaps there is also a lack of technology, which makes it difficult to charge for the services in an efficient manner. The latter can be exemplified by roads that have long lacked efficient payment forms, but which now have a changed situation through the introduction of new payment technologies.

The existence of externalities, generally negative externalities, can also lead to markets not functioning effectively and they have often justified government interventions, for example, to manage noise or emissions. The environmental impact of transportation is an area that has recently received increased attention, something which tends to increase the number and scope of public measures aiming to reduce transport-related emissions and to support the development of technology in the direction of alternative fuels.

The difficulty in arranging market-based negotiations on externalities in market form can be explained by the fact that they are often diffuse in their extent and cover a relatively undefined number of parties. For example, with respect to noise or other emissions into the air, the transaction costs are high. This in turn is something that justifies measure from the public sector. Emissions trading, which is used to manage externalities relating to air, for example, with respect to carbon dioxide, is an example of a more market-conforming measure.

A further aspect of what is often perceived as market failure has to do with distribution aspects of various kinds. It is often asserted that the outcome to which market solutions lead provide a distribution of income and wealth that is not in agreement with the

political objectives of distribution policy. Spatial dimensions are also included in this, since it can be argued that market solutions do not provide the regional policy's desired spread of, e.g., infrastructure systems, but tend rather to follow the large flows where there is a willingness to pay. Whether these latter aspects should be linked to market failures in a theoretical sense is debatable. However, in the political debate, these aspects are often of great importance and can justify such intervention.

Just as with the dichotomy between collective and private goods and services, it is difficult to gain an unequivocal picture of which model for the planning and organising of transport infrastructure is to be preferred on the basis of the theory. Once again, a choice needs to be made between various ambitions on the basis of the circumstances at each point in time.

4.3 Summary

This section has shown that there are a number of theoretically grounded discussions focusing on how systems such as roads and railroads can be organised and financed to achieve good resource management and coordination. The various perspectives treat a number of conceptual pairs and bases of classification with respect to how a discussion and analysis of the economy, and in a wider sense, the social order can be arranged.

One pair of concepts concerns how the economy can be divided into different types of goods and services, those that are collective and those that are private in nature. It also concerns how the possibilities of achieving sound resource utilisation through coordination under public management and under private management should be viewed. The counterpart to these two models is then the notion of failure in both models, commonly market failures and public-sector failures.

The spatial level also plays a decisive role in organisational and financing models. Here, parallels can be drawn both to planning theory, where models with insufficient information in the area of public finance and “fiscal federalism” can be applied, and where studies are made of issues such as how tasks and responsibilities are best distributed between different levels in the public sector.

Assigning fees from users of the systems directly to the producing organisations is a model, which may be assumed to lead

to stronger efficiency incentives in both the public sector and in markets, where this is something of a given. Similarly, it is important to draw attention to the opportunities to shape public decision levels where the division of tasks goes hand in hand with available tax bases.

The review primarily demonstrates that the question of how the road and railroad systems should best be organised and financed can be analysed in several different ways. There is no unequivocally given model that yields an unambiguously “better” outcome than another. What is to be preferred in different situations may instead be assessed case by case, based on a number of circumstances that can, for example, be attributed to technology, economy and policy, factors included in the report's development model for transport infrastructure.

5 Conclusions and proposals for changes

5.1 Challenges in several dimensions

As discussed in the report, the future will see several different trends with respect to the organisation and financing of transport infrastructure, in part exemplified by developments in several other countries. Pressure for change and development can be attributed to all the factors included in the report's model for long-term development, as described in chapter two.

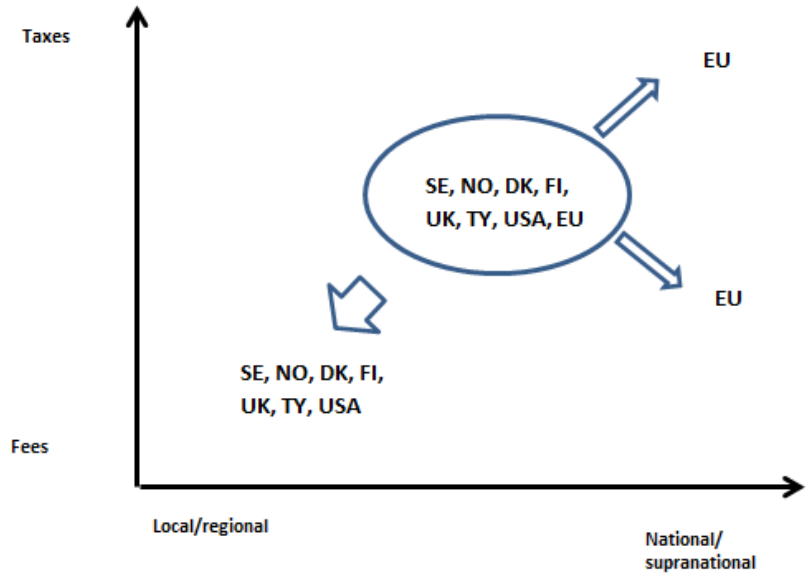
An appendix to the report provides examples of measures to increase the efficiency of transport infrastructure, which have, respectively, a more optimising or a development-oriented and dynamic purpose. Most of these measures have been tried out, but should also be included in continued reform efforts.

5.1.1 International experiences

The international study shows, as exemplified above, a pressure for change in all the countries studied. Reconsiderations of the government/public responsibility and the opportunities to increase the efficiency of publicly operated systems, and to increase the presence of alternatives to public financing, may be noted in most of the countries. The most far reaching change with respect to road issues appears to be planned in the United Kingdom, but shifts of various kinds are taking place in all the countries. The direction chosen in different countries is of course dependent on tradition and historical experience, but is also explained by purely political aspects, such as the attitude to deregulation and to government regulation.

Below is an overview and schematic illustration of the direction of movement that appears to be at hand in most of the countries studied in the report.

Figure 5.1 Development overview with respect to organisation and financing model



A tendency in many of the countries studied in the report is that a shift is taking place from the existing model (the oval in the figure above) of government responsibility and tax financing to alternative models. This is a joint effort towards finding alternatives to tax financing for road and railroad infrastructure with a greater fee element, at the same time as there appears to be a trend of regionalisation in several of the countries with regard to responsibility, primarily for roads. At present, the impetus to find alternative sources of financing appears to be stronger than the regionalisation trend. Here, the sovereign debt problems probably represent a strong incentive for change. But there is also a clear focus on a more fundamental change to the division of responsibilities and financing forms in several countries.

An opposite trend, primarily in the EU, but also for individual bilateral projects, is enhanced supranational coordination. So far,

however, this is a matter of relatively limited financial resources being channeled through the EU, compared with the investments of the Member States. An interest is also discernible here both for tax financing and for various forms of fee financing, thus justifying the two “development arrows” for the EU in the figure. It is still unclear how far these supranational coordination tendencies will lead in the EU. Among other things, the outcome of negotiations on the EU's forthcoming budget appears to be that infrastructure will not be given the planned expanded scope.

There is of course no constitutional or absolutely compelling need for the government and other actors to implement changes at any given time to meet the challenges. Also noteworthy is that there are experiences from the deregulation and re-regulation of recent years in several countries that entail the taking of measures to strengthen the regulation of the road and railroad markets. Deregulations in transport may have led to an undesirable concentration in the market or quality deficiencies, or to unwanted price rises. With respect to railroad deregulation in the United Kingdom, it may also be noted that the first deregulation led to certain unwanted effects whereby the incentives for a long-term focus of activities became too weak. The transition to the Network Rail organisation, which exists at present, was a response to these perceived shortcomings of the original deregulation.

In the present situation, however, there appear to be a number of trends in action that will eventually demand some form of reaction from the government to adapt the role to new conditions, in a similar way to that which the government has done in the last 70 years of government ownership of the systems. This relates to the geographical dimension, the organisational solution and issues of financing, cost-effectiveness and development/innovation. Many different activities are in progress, such as within the Swedish Transport Administration and other actors in the sector, to increase efficiency and seek new working forms. However, there is no overall strategy on the part of the government to address the challenges.

The changes in Sweden and in other countries will, in one way or another, need to be met with well-analysed and active measures by the government and by other actors. If we do not gradually adjust the current organisation and financing system to changed circumstances, there is a risk that the financing of transport infrastructure will be hampered by a gradual change and weakening

of the tax bases, and that Sweden will lose opportunities for influence and development within the EU.

There is also a need to review how transport infrastructure is to be fitted into a new regional form of organisation in Sweden. This is to relieve the government of responsibility and tasks and to open the way for a division of responsibility that can provide a more effective management of roads and railroads. At the same time, it is of course not possible to determine exactly when measures must be taken. However, it appears probable that we are approaching a situation where several processes combine to produce a great pressure for change.

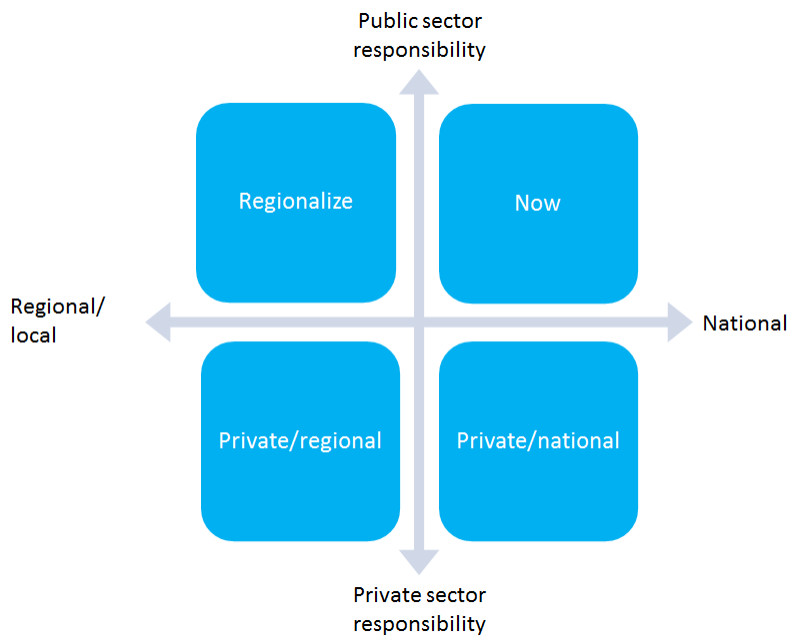
The challenges operate in several different dimensions that affect resource utilisation and the division of responsibilities in the road and railroad systems. One aspect of the challenges is which tasks should be performed in the public sector and which can be performed by actors in other sectors. In addition, there is a geographical dimension to the division of tasks between different levels of society. These arguments can be linked to the report's development model, where technology, economy and policy influence how transport infrastructure is organised and financed.

5.1.2 Trade-offs in a reform

Division of responsibilities and geographical level

To begin with, there needs to be a readiness to seek a new balance between actors in the private and public sectors and in relation to the geographical level at which the responsibility lies or should be placed. This is illustrated below.

Figure 5.2 Responsibility and geographical level



A development from the current situation is conceivable where there is a clear and centralised public sector association of the road and railroad systems to a more decentralised model under public management, or to a model with greater scope for private actors at the national or regional level. An example of such a movement seems to be that of the United Kingdom's apparent shift towards the model of private structures with public regulation at the national level. In the United States, there is a movement of initiatives from the federal to the state level, partly in light of the extensive fiscal imbalances. In Denmark and Finland, there are examples of the government having opened the door to alternative financing, primarily of national bridge and tunnel projects, while in Norway, the regional level has been given the corresponding opportunities.

A strengthening of the regional level in Sweden would be a model that would create opportunities for a transfer of responsibility for roads and railroads to this level. A potential reorganisation of the regional level into 11 counties, recently proposed by a government committee (SOU 2012:81), could

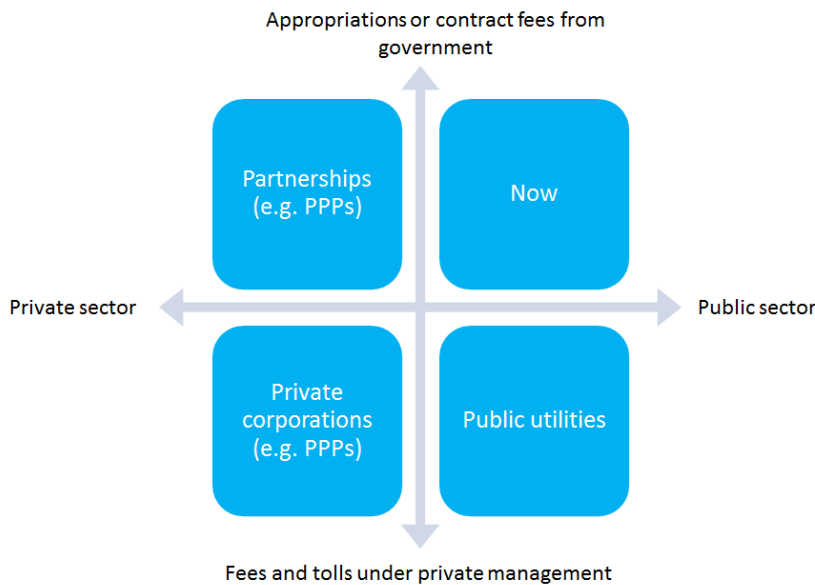
provide a new geographical basis for such a new division of responsibility, that has been lacking thus far. Among other things, the new inquiry proposes a strengthening of the role of regional urban planning in the new county administrative board. This is naturally a role that must be shaped within the interaction between locally and regionally elected bodies at the regional level. Taken together, the proposals would open the way for a new regional playing field with new stronger actors. This may in turn open the way for another division of responsibility for urban planning and for systems such as roads and railroads.

Financing model and the balance between public and private

Another dimension relates to the financing of the systems. Should this be accomplished with appropriations based on tax revenues or through fees or tolls (with earmarking) of various kinds? And should the responsibility for the road and railroad systems remain in the public sector or be transferred to the private sector? These dimensions are reflected in the figure below, where models representing hybrids of these models are of course also possible.

Based on the current organisation with government financing largely with appropriation funds based on tax revenues and with roads and railroads managed by agencies under the government, a trend towards a more independent public utility-like organisation or government-owned limited company is conceivable. Such examples can be found in several other countries, such as Denmark and Germany, but also within other infrastructure sectors. This model was also used previously for several infrastructure activities in Sweden and is currently applied for Svenska Kraftnät (Swedish National Grid) for the strategic grid for electricity transmission and for properties related to railroads in the government-owned corporation Jernhusen AB. Certain local infrastructure activities in municipalities run according to the “full cost principle” are also organised in this way.

Figure 5.3 Financing models and the public/private division



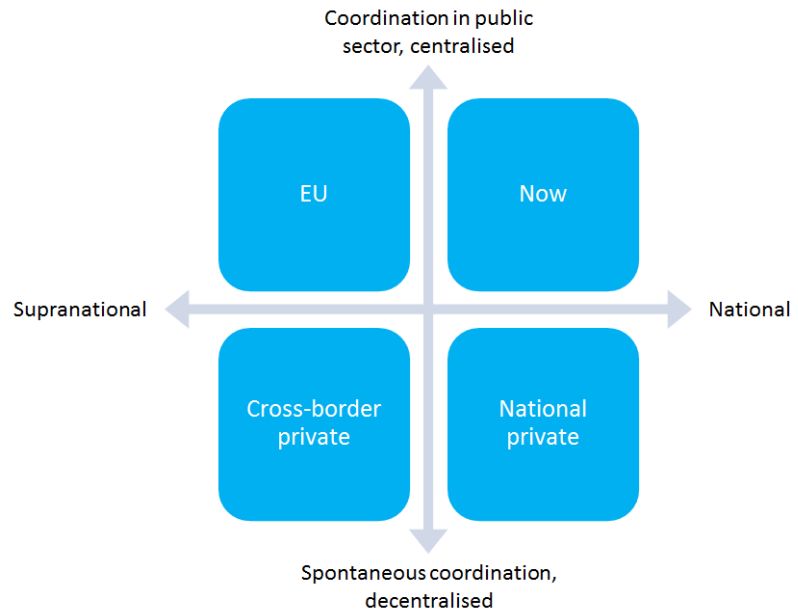
Various partnerships in which private and public actors collaborate may represent private-sector alternatives. These can be centered more towards the public direction, where public financing dominates, or more towards the private direction, where activities and financing are largely organised under private management. Examples of the former might be projects with collaboration between a public actor that builds a road or railway, but invites the participation of other actors. This is the case in several countries.

PPP arrangements in which the government/public sector retains the financing responsibility and takes the ultimate risk also lie within this area. Examples of this might be the PPP motorway projects in Germany according to the “A model”, or Finland, where compensation is payable according to the quality criteria that may be considered to have been set up according to the availability-based model. The PPP projects according to the German “F model” may be considered examples of the more private model. Norway's Bompengeselskap are somewhat of a hybrid model of public responsibility at the regional level, financing with tolls being earmarked for the projects and with government involvement in construction and ownership.

Planning and coordination

A further dimension is the balance between coordination of the transport infrastructure systems under public management and under private management in relation to the geographical level at which responsibility for the activities lies. Here, several different geographical levels are conceivable, but here below a comparison of the national and the supranational levels is given.

Figure 5.4 Planning model and national/international dimension



At present, a large part of the responsibility for bringing about sound resource utilisation rests with the public sector. In principle, the coordination of resource utilisation is ultimately performed as a balance between available resources and the allocation of funds to various types of measure, as carried out at the Swedish Transport Administration and at the Government Offices as well as in the political system at the national level. However, this centralised model is combined with relatively extensive processes for gaining the support of municipalities and county councils for decisions on such things as investment plans. This is also the organisational model used in most of the countries studied for the majority of the

national road and railroad systems, with varying degrees of regional support.

One alternative at the national level to the current organisational solution would, of course, be a transfer of responsibility to the private sector so as to bring about planning and coordination of the resources. The closest example in Sweden is perhaps other infrastructure systems, such as telecommunications and electricity distribution, where this transfer to the private sector has already partially occurred. In other countries, there are also examples of such decentralised market-organised systems, such as railroads in the United States or water supply in the United Kingdom. It should of course be noted here that even in the context of a private sector model, coordination can take place at varying levels of organisation. Organisations in the private sector also have a need for planning and coordinating activities internally, which can take place both through decentralised and more central forms, depending on the specific conditions in the particular sector or industry.

When introducing the supranational perspective, there are, in the same way, various models for organising roads and railroads; in the public sector or in the private sector. Cross-border infrastructure organisations under public management are conceivable (such as the EU planning agency TEN-T-EA or organisations for air traffic management built up between, e.g., Sweden and Denmark). A trend is also reflected in the EU, whereby transnational corridors are being organised for railroad infrastructure. It may also be noted that road infrastructure in the United States is based on a principle of state responsibility and relatively extensive federal coordination.

Alternatively, cross-border organisations under private management can be arranged, such as corridor railroad companies in Europe or cross-border road organisations. In other infrastructure sectors, cross-border structures of this kind have existed for a long time, matching the decrease in scope of national regulations. Viewed over time, a more transnational approach has applied during certain periods, while national interests have often prevented such development, at least in Europe. A corresponding exchange between federal and state responsibility, e.g. for the road system, may also be observed in countries such as the United States and Germany.

5.2 Potential development paths for Sweden's road and railroad systems

This report aims to study the challenges facing transport infrastructure. The introduction provided a summary of these challenges:

- How in the future can we find a balance between the provision of roads and railroads under public management and under private management that meets the requirements of efficient resource utilisation and provides scope for innovation and development?
- How in the future can we find a balance between the various geographical levels (local/regional, national, supranational) that provides a rational division of responsibilities and tasks between the various levels with respect to roads and railroads and that supports efficient resource utilisation, while allowing scope for innovation and development?
- How in the future will roads and railroads be financed in a situation where new forms of payment are emerging and where shifts in available tax bases are taking place?
- What challenges face the government in this situation and how can the role of the government in terms of the road and railroad systems be formed in various future scenarios?

Sketching the outlines of a potential reform program, a number of aspects from reasoning earlier in the report appear to be important to include in the discussion. Here, it is important to point out that it is a question of very complex relationships and conditions in society and the economy. In seeking an organisational structure and forms of financing that can increase overall efficiency, it is therefore a question of seeking new points of balance between different perspectives rather than being able to provide unequivocal recommendations for an effective solution. The following proposals should be seen as an attempt to present such modified points of balance in the area of roads and railroads.

Division of responsibility between geographical levels

A number of measures could be considered with respect to *the division of responsibility between different levels of the public sector* and with further potential openings for a modified balance between public and private operation and financing as a second step.

Firstly, it appears clear that the division of responsibility between different geographical levels should be able to be changed to improve clarity in the assignments, but also to group tasks at the level that has the best conditions for operating activities with a good knowledge of local and regional aspects and of national and supranational aspects. Another aspect is to transfer responsibility for systems to the level where financing forms that give fewer distortions can be designed, closer to the interest principle. It would therefore be reasonable to *consider separating off the parts of the Swedish Transport Administration's current activities that are primarily national to a new national organisation* and consider a clearer decentralisation of the other parts, primarily of the road network, to regions and municipalities. Work to perform this overhaul of road maintenance responsibility is underway at the Swedish Transport Administration, but should be able to be expanded in its level of ambition.

Corresponding changes in the division of responsibility have been made in several of the countries studied. It is common for the road network managed by the government to cover somewhere between 5 and 10 per cent of the total road network. The government and municipal road networks in Sweden cover about 140,000 km. E-roads and national roads cover about 14,500 km, while motorways and other major roads correspond to about 5,000 km. It appears reasonable for a new government road network to aim for about this scope, that is, about 20,000 km or 10-15 per cent of the entire road network, which would be a very significant reduction compared with today. Traffic volume measured in vehicle kilometres is approximately 40-50 per cent of the total traffic volume in this road network. This in itself is a road network where a fee model could be introduced relatively easily, something which should be able to be considered in conjunction with an overhaul of this kind.

A conceivable next step would be to *consider a change of ownership of the more limited government road network*, and to consider alternative financing in parts of the regional and local road

networks. Here, examples from the United Kingdom and Norway have been presented, which could be good sources of inspiration for an overhaul of this kind.

An alternative for consideration would be to *investigate the possibilities of a joint Nordic organisation of transport administrations for those sections of the road and railroad networks* that have a truly national and cross-border function. This could open the way for taking advantage of further economies of scale and for being able to manage joint Nordic projects, such as the “Nordic Triangle” (railroads and roads connecting the Nordic capitals) or Öresund related (the wider Copenhagen – Malmö region) issues, on a more overarching plane, without the need for special solutions in various issues. A question in this context is, of course, whether Norway can participate in such an organisation, given that the country is outside the EU, as well as whether all four, or fewer, Nordic countries should be part of this. The pros and cons of different models should be considered with an open mind. Another question is whether there really are such great synergies that a joint Nordic solution is something from which all the countries can gain. This needs to be studied and a final balance between the various interests needs to be made.

It should also be possible to consider changes with respect to railroads. A possibility here is to *consider transferring railroads that mainly have a regional function to new regional organisations*, analogous to the metro in Stockholm, which is managed regionally. A parallel could be sought in the southern Swedish region Skåne, which has a high proportion of regional and local traffic on parts of the railroad network, but similar examples can be found in many parts of the country.

How to organise – public or private?

The historical review shows that the arguments for how roads and railroads should best be organised have varied over time. In periods with the desire for rapid development and consideration, the private sector has often played an important role. The government has then often had the role of initially supporting private actors in expansion phases by means of legislation and financing support of various kinds, to later assume the role of restructuring and adapting the systems to new challenges following expansion phases such as

those taking place through the nationalisation of the 1930s and 1940s.

There is no conclusive evidence of a general need for increased resources for transport infrastructure, at least not beyond the increases in resource allocation announced by the government in 2012 (Govt. Bill 2012/13:25). However, with the development of new payment technology, there are a number of trends that provide *increased opportunities to charge for utilisation of the systems* and thus opportunities to organise transport infrastructure *in market-like forms to a greater extent* than before. One experience from other infrastructure markets is that technology shifts of this kind have gradually given rise to a change in organisational form of the activities and an increased innovation pressure. This could be an indication of an increased element of private forms of operation in transport infrastructure in the future.

A development towards more parts of the road and railroad organisations previously operated under public management being separated off into more market-like organisations has also been apparent over the last 20-30 years, with the spin-off of consultancy activities and resources for construction and maintenance. Various forms of contracting in investment and maintenance are now being considered to a greater extent, something which may eventually develop into increasingly independent branches of activities, possibly with their own financing.

Another form of this kind, that is being considered in most other countries studied in this report, is *various PPP solutions*. It seems likely that these solutions in some cases could lead to such great incentive-related improvements that it should be reasonable for them to also be considered in Sweden. It is difficult to see that the government's current position on the issue as being sustainable in the future.

The challenge is to strike a balance between various organisational measures that increase incentives for organisational/business efficiency without the occurrence of obvious economic inefficiency. However, this largely has to do with whether the pricing of the services provided is set according to welfare economic principles. Under a system with such general tax and fee models in the country, it should be possible to open the door even further to various forms of more market-based solutions of this kind. This view is reinforced by the occurrence of more experimentation with alternative forms of organisation in other

countries, which have a similar view on the need for management principles based on welfare economic principles.

On a nationwide level, *a public utility form for the railroad system could be considered*, similar to Svenska Kraftnät or to Network Rail in the United Kingdom. It is probably difficult to finance these activities solely with charges from the users, but various forms of increasing user financing should be investigated in order to increase customer influence over the activities.

Another model to consider would be a *corridor organisation for railroads* with a number of “main line organisations”. One question that can be kept open in this context may be whether a re-integration of responsibility for traffic and infrastructure is an alternative that should be considered. There are examples of such re-integration being considered, in particular with a corridor-based organisation, in the United Kingdom, for instance. It is not obvious how this could be designed given that EU regulation in principle requires a separation. It is also important not to implement such reintegration unless there are obvious reasons for assuming that efficiency gains that exceed the relatively extensive reorganisation costs can be achieved.

It is also important to specifically monitor industry's transport needs if changes are made to organisational forms and the division of responsibility. However, it is possible that a functional separation of the railroad network into several parts could open the way for railroad sections becoming more clearly oriented towards continuing to address the needs of industry today, even if the joint transport of both freight and passengers is common. The question should be able to be investigated in conjunction with the consideration of other organisational changes.

It would also be conceivable to *organise new railroad lines, such as the Eastern Link, in separate organisations*, separated from the Swedish Transport Administration in order to bring about a clearer management of these parts of the railroad network. Corresponding changes could also be considered for the road network with PPP solutions or more far-reaching privatisations of various parts of the road network.

Future forms of financing

Finally, it should be possible to consider work to adapt *regulations in Sweden to a situation with a more open attitude to increased competition and use of alternative forms of financing*, both for project financing and the financing of facilities taken into operation. The risk that the tax bases will be weakened by more effective and more fuel-efficient vehicles is a development that needs be considered in this development.

Several other countries also have forms of financial participation at the regional and local levels through fees and taxes, *such as local property or sales tax*, as a financing base for transport infrastructure measures. This is a model that should also be able to be considered in Sweden so that, for example, the property owners benefiting from a road or metro extension will be involved in co-financing such ventures. In the major cities, this appears to be a measure that could mean a significant transfer of financing responsibility for various ventures from the public to the private sector (such as property owners).

Another form of capital that is being increasingly discussed for use in future transport infrastructure is *pension capital*. There are already several market actors of this kind that are looking for infrastructure projects to make long-term investments of pension capital as an alternative to other forms of investment. In the Nordic countries, interest has been expressed from the Danish government pension fund, but also in relation to the Norwegian oil fund, one of whose purposes is retirement savings.

Such financing would of course be able to reduce the pressure on direct government financing with appropriations for various projects. But that does not provide any relief with regard to the ongoing financing of roads and railroads, which still requires government appropriations. At the same time, from a historical perspective, it may be useful to recall that there have been various forms of “bubble phenomena” with respect to investments in infrastructure. The problems with the railroad bond market of the 1800s represent an experience that should give rise to caution regarding excessively large ventures of this kind.

The possible *changes to other regulations that may be needed to enable increased fee financing* might be another element. These latter issues have been partly investigated by a government inquiry in 2012 that will submit its final proposals in spring 2013 (the 2011

road toll inquiry, dir 2011:47, 2012:65). A key question related to these issues is whether a transition to distance-based road tolls and road taxes could be made in Sweden. This is a question that has long been difficult to manage politically. However, efficiency reasons, including the possibilities of achieving a better environmental management of traffic in the road and railroad networks, suggest that such a model could also open the way for forms of operation that have a clearer incentive orientation than today's government agency model.

Assessments naturally need to be made of the effects on competition between different transport modes that increased fees may cause. This, however, lies outside the scope of this study.

A standard agreement for PPP projects, as found in several other European countries and in some US states, could be a part of such a revised regulatory framework, which lowers the transaction costs in PPP agreements and provides rules that satisfy the need for transparency from the public sector. Here, there are examples from other countries that Sweden can learn from, such as the British PF2 example.

The government's future role

A natural consequence of several of the proposals is, of course, an investigation of whether the government's organisation in the area, currently *the Swedish Transport Administration*, could be given a lesser scope than today and be mainly focused on covering the *planning functions* and the financing role. This was a proposal that was considered in conjunction with the formation of the Swedish Transport Administration. A new consideration may now be appropriate.

Another aspect to take into account in the context is *whether the intermodal approach is the right approach for the future*. The intermodal perspective has several theoretical advantages on the basis of an overall view of rationality. At the same time, this is an expression of a belief in coordinated and centralised planning, which appears less likely to be able to lead to the positive effects intended, in accordance with the discussion in this report. There may thus be reason to evaluate the experience of this working method as part of a greater consideration of the policy area.

A rebalancing between geographic levels in the system would naturally need to be combined with some kind of *tax shift between the government and regions/municipalities*, even if the proportion of fee financing could be increased. This issue, of course, needs to be examined carefully in a context that weighs in the financial relationship between the government and regions/municipalities.

In the event that it is decided to proceed with a joint Nordic solution for the organisation, a relocation of common functions to one of the collaborating countries would naturally need to be considered. Inspiration for such organisational models may be sought in financial corporations, infrastructure operations and activities such as the postal services. There are of course both good and bad examples to study here.

5.3 Summary reform program based on the proposals

- Review the division of responsibility for roads and railroads between different levels of the public sector
- Consider separating the parts of the Swedish Transport Administration's current activities that are primarily national to a new national organisation
- Consider a change of ownership of the more limited government road network
- Investigate the possibilities of a joint Nordic organisation of transport administrations for those sections of the road and railroad networks that remain in the government after a redistribution
- Consider a possible transfer of railroads that mainly have a regional function to new regional organisations
- New technology provides increased opportunities to charge for utilisation of the systems and makes it possible to organise transport infrastructure in market-like forms to a greater extent
- Consider various PPP solutions
- Consider a public utility form for the railroad system or a corridor organisation for railroads
- Organise new railroad lines, such as Ostlänken (the Eastern Link), in separate organisations

- Adapt regulations in Sweden to a situation with a more open attitude to increased competition and use of alternative forms of financing
- Open opportunities for local property or sales tax as a source of financing for infrastructure projects
- Investigate the changes to regulations that may be needed to enable increased fee financing
- Consider developing a Swedish standard agreement for PPP projects
- A consequence of the other proposals is that the Swedish Transport Administration could be given a lesser scope than today and be mainly focused on covering the planning functions and financing functions
- One question in the context is whether the intermodal approach is the right approach for the future. This working method should be evaluated.

References

- “A fresh start for the Strategic Road Network - Managing our roads better to drive economic growth, boost innovation and give road users more for their money” Alan Cook, November 2011, UK.
- ”Anbefallning om regionale bompengeselskaper” Rapport 5. September 2012, Statens Vegvesen.
- Andersson Skog, L. (1993) "Såsom allmänna inrättningar till gagnet, men affärsföretag till namnet". SJ, järnvägspolitiken och den ekonomiska omvandlingen efter 1920. Umeå.
- Andersson-Skog, L. (2000) The Making of National Telephone Networks in Scandinavia. The State and the Emergence of National Regulatory Patterns 1880-1920, i Magnusson, L. och Ottosson, J. Evolutionary Economics and Path Dependence, Edward Elgar, UK.
- Arthur, B. W. (1989) Competing Technologies, Increasing Returns and Lock-in by Historical Events, *The Economic Journal*, Vol. 99, No. 394, pp. 116-131.
- Bohm, P., Bruzelius, N., Hesselborn, P.-O., Johannesson, M., Ruud, T., Thedéen, T. (1974) Transportpolitiken och samhällsekonomin, LiberFörlag, Stockholm.
- Chandler, A. D. (1992) Capabilities and the Economic History of Industrial Enterprise, *The Journal of Economic Perspectives*, Vol. 6, No. 3, pp. 79-100, American Economic Association.
- Clifton, J., Lanthier, P, Schröter, H (2011) Regulating and deregulating the public utilities 1830-2010 *Business History*, 53:5, pp. 659-672.
- Coase, R. H. (1974) The Lighthouse in Economics. *Journal of Law and Economics*, Vol. 17. No. 2, pp. 357-376. The University of Chicago Press.
- “Evaluering av OPS i vegsektoren” (2007), Transport Ökonomisk Institutt, rapport 890/200/, Oslo.

- ”Europe 2020 Project Bonds”, Commission Staff Working Paper 28.02.2011, Europeiska Kommissionen.
- Goldin, K. (1977) Equal access vs. Selective Access: A Critique of Public Goods Theory. *Public Choice* Vol. 29, No. 1, pp. 53-71, Springer.
- Hasselgren, B. (2013) The Swedish government as owner of transport infrastructure – policy formation from the 1930s to the 2010s. *Scandinavian Journal of Public Administration*, Vol. 16, No. 4, pp. 49-71.
- Hasselgren, B. och Fogelström, P. (1990) Vägverkets investeringsplanering i praktiken, *Ekonomisk Debatt* Nr 5/90, pp. 508-513.
- Hayek, F. A. (1944) ed av Caldwell B (2007) *The Road to Serfdom, Text and documents*, The University of Chicago Press.
- Hayek, F. A. (1960) ed av Hamowy R (2011) *The Constitution of Liberty - The Definitive Edition*, The University of Chicago Press.
- Hultkrantz, L. och Nilsson J.E. (2004/08) *Samhällsekonomisk analys*, SNS Förlag, Stockholm.
- Innovative Financing of Infrastructure – the role of public-private partnerships*. EIB –papers, Vol. 10, 2005. European investment Bank..
- Jernbaneverket (2012) ”Høyhastighetsutredningen 2010-2012, Konklusjoner og oppsummering av arbeidet i Fase 3”, Oslo 2012.
- Johnson, D. och Turner, C. (2007) *Strategy and Policy for Trans-European Networks*, Palgrave McMillan, UK.
- Jupe, R. E. och Crompton, GW (2003) Basically a Half-way House: Not for Profit in British Transport. In: *Ninth Accounting and Management History Conference*, Paris.
- Kaijser, A. (1994) *I fädrens spår...*, Carlssons Bokförlag, Stockholm.
- Klein, D. B. (2012) *Knowledge and Coordination – A liberal interpretation*. Oxford University Press.
- Kommunikationsministeriet (2008) *Riktlinjer för trafikpolitiken och utvecklings- och finansieringsprogram för transportnätet fram till 2020*. Kommunikationsministeriets publikationer 31/2008, Helsingfors 2008.
- Lindsey, R. (2006) *Do Economists Reach A Conclusion on Road Pricing? The Intellectual History of an Idea*, Economic

- Journal Watch, Vol. 3 No. 2, pp. 292-379, Econ Journal Watch.
- Medema, S. G. (2009) *The Hesitant Hand, Taming Self-interest in the History of Economic Ideas*, Princeton University Press.
- Millward, R. (2005) *Private and Public Enterprise in Europe*, Cambridge University Press.
- Millward, R. (2011) *Public Enterprise in the Modern Western World: An Historical Analysis*, *Annals of Public and Cooperative Economics*, 82:4, pp. 378-398, Blackwell Publishing Ltd.
- Mosca, M. (2008) *On the origins of the concept of natural monopoly: Economies of scale and competition*, *The European Journal of the History of Economic Thought*, 15:2, pp. 317-353, Taylor & Francis.
- National Infrastructure Plan 2010, October 2010, HM Treasury, London.
- Nilsson, J.-E. (2009) *Nya vägar för infrastruktur, Offentlig-privat samverkan*, SNS Förlag, Stockholm.
- ”Norske bilavgifter - NAFs innspill til et helhetlig avgiftssystem”
Norsk Automobil-Forbund, Februari 2011.
- North, D. C. (1990) *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, New York.
- North, D. C. (2005) *Understanding the Process of Economic Change*. Princeton, New Jersey.
- Oates, W. E. (2005) *Toward a Second-Generation Theory of Fiscal Federalism*, *International Tax and Public Finance*, 12, pp. 349-373, Springer Science.
- Pennington, M. (2011) *Robust Political Economy, Classical Liberalism and the Future of Public Policy*, Edward Elgar Publishing Limited, UK.
- Pierson, P. (2000) *Increasing Returns, Path Dependence and the Study of Politics*, *The American Political Science Review*, Vol. 94. No. 2, pp. 251-267.
- PFI: *Construction Performance*, National Audit Office, 2003.
- Public and private financing of infrastructure: Evolution and economics of private infrastructure finance*. EIB Papers Volume 15. Vol. 1 and 2/2010. Europeiska Investeringsbanken.
- Proposition 2012/13:25, *Investeringar för ett starkt och hållbart transportsystem*, Stockholm.

- Riksrevisionen, Medfinansiering av statlig infrastruktur (RiR 2011:28), Stockholm.
- Riksrevisionen, Statens satsningar på transportinfrastruktur – valuta för pengarna (RiR 2012:21), Stockholm.
- Samuelsson, P. A. (1954) The Pure Theory of Public Expenditure. The Review of Economics and Statistics, Vol. 36, No. 4, pp. 387-89.
- Samuelsson, P. A. (1955) Diagrammic Exposition of a Theory of Public Expenditure. The Review of Economics and Statistics, Vol. 37, No. 4, pp. 350-356.
- Schumpeter, J. A. (1942) Capitalism, Socialism and Democracy, Harper Perennial Modern Thought (2008).
- Schön, L. (2010) Swedens' Road to Modernity – An Economic History. SNS Förlag, Stockholm.
- Sobel, R. S. (2004) Welfare Economics and Public Finance in J.G. Backhaus and R.E. Wagner (eds), Handbook of Public Finance, Boston, MA: Kluwer Academic Publishers, pp. 19-51.
- SOU 1947:85, "Det inrikes trafikväsendet", 1944-års trafikpolitiska utredning, Stockholm.
- SOU 2009:31 Effektiva transporter och samhällsbyggande - en ny struktur för sjö, luft, väg och järnväg, Stockholm.
- SOU 2011:49, Medfinansiering av transportinfrastruktur. Stockholm.
- SOU 2012:60, Avgifter på väg och i elektroniska system, Stockholm.
- SOU 2012:81, Statens regionala förvaltning, förslag till en angelägen reform, Stockholm.
- Svenskt Näringsliv (2009) Söderström L, Rättvis beskattning enligt Knut Wicksells tolkning av intresseprincipen, Stockholm.
- Transportministeriet (2011) En grön transportpolitik. Status för de strategiske analyser, Köpenhamn.
- Tiebout, C. (1956) A Pure Theory of Local Expenditures, Journal of Political Economy, Vol. 64, No. 5, pp. 416-424, Chicago University Press.
- Wagner, E. R. (2007) Fiscal Sociology and the Theory of Public Finance. An exploratory Essay. Edward Elgar, UK and USA.
- Webster, C. (2002) Property rights and the public realm: gates, green belts and Gemeinschaft, Environment and Planning B: Planning and Design, Vol. 29, pp. 397-312.
- Williamson, O. E. (1981) The Economics of Organization: The Transaction Cost Approach, The American Journal of

- Sociology, Vol. 87, No. 3, pp. 548-577. The University of Chicago Press.
- Williamson, O. E. (1999) Public and Private Bureaucracies: A Transaction Cost Economics Perspective, *The Journal of Law, Economics & Organization*. Vol 15., No. 1, Oxford University Press.
- Winston, C. (2010) *Last Exit – Privatization and Deregulation of the U.S. Transportation System*. Brookings Institute.

Appendix

Future development models for organisation and financing – some examples of measures

A future model for organising transport infrastructure needs to be able to meet the needs both of economic efficiency and of organisational, or more business-oriented, efficiency. Viewed over time, the strength of both these principles has varied in Sweden and in other countries in the area of transport infrastructure.

In periods when there has been a focus on the competition perspective and full cost coverage has been the objective in Sweden, the various systems have been to some extent sub-optimised. This has possibly risked a total over-investment, even though the allocation of resources to the two systems was quite tight for long periods. In periods when economic efficiency was highlighted as key, there was instead a tendency for an “excessive” focus on optimising the systems as such, without directly looking to the interests of the customers/users, while the owner, the government, appears to have downgraded the question of the managing organisations' efficiency.

One criticism of the welfare economic-oriented governance might also be that it led to excessively small-scale or differentiated measures being taken in the road and railroad systems. Defining relatively limited projects can achieve high formal economic profitability in the measures, and when these are then graded according to economic profitability in the action plans, there is a tendency to “hunt” for bottlenecks, which, however, tend to always recur in new places in the systems. Corridor analyses might be a way of remedying this phenomenon, an approach that perhaps can be said to be based more on a production economic approach than on a welfare economic logic.

One way to interpret the interplay between the approaches is to see them as, on the one hand, the expression of the pursuit of high efficiency or optimisation based on available resources, which may be linked to a traditional welfare-theoretical perspective. On the other hand, one might instead look at how conditions can be created for a development dominated by entrepreneurship, learning, innovation and development. The latter is more in line with an institutional dynamic perspective.

What are the various measures to meet future challenges that, based on the two approaches, can be conceived of as being able to contribute to improved efficiency and to meet the challenges discussed in the report? Here follows a presentation of a number of measures that are often raised in the discussion, grouped according to these perspectives, but without any claims to exhaustiveness or to clear prioritisation among the various measures. Several of them can obviously be included under both perspectives. However, the division is relevant in order to clarify the “playing field” we are on when addressing various issues. Most of these measures have already been taken and considered before. Various efforts are also underway to review and investigate more of them. In a forthcoming work to adapt organisations and working methods, these will naturally be important elements of an agenda for change.

- *Cost-minimising measures and measures focused on the optimal use of resources based on available resources:*
 - Better management of appropriations for maintenance – e.g. by finding more efficient forms of internal management. This might be more developed and standardised forms to assess maintenance needs, clearer reporting systems for implemented measures so that these can be followed up in terms of costs and effects.
 - Better appropriation management – in many countries and in Sweden, the organisations that manage road and railroad infrastructure can be seen to have a need for a more flexible view of how appropriation funds can be utilised. A strict one-year perspective on allocated funds, although providing good management of the government budget, can lead to an erratic and short-sighted implementation of maintenance and

investment. This is particularly the case if the available resource frame is fully utilised, as is often true in Sweden. Here too, measures might cover better reporting and follow-up of various measures might play an important role.

- Better investment management with better data – here is an ambition to improve both the project-related policy documents and forms of project management, such as using advanced and cost-related risk management to produce correct decision-making documents in the form of economic calculations. Measures to ensure the quality of this type of data is often a part of these measures.
- Optimal pricing and taxation – this can be seen as part of efforts to achieve good economic efficiency in the systems. This can be done by obtaining financing for as limited a social cost and inefficiencies as possible and with a link between responsibility for activities and the distribution of tax bases. This can also be done by users of the systems being brought to adapt their utilisation of the systems in a way that leads to better goal achievement, e.g. by reducing their use of environmentally damaging vehicles. The latter measures belong to a type of measure that, properly designed of course, will also be able to contribute to a dynamic process of substitution from “worse” to “better” vehicles and less utilisation of the systems at peak times.
- *Development-oriented measures with a development-oriented dynamic perspective:*
 - A life cycle costing approach to investments and maintenance – this is an approach and a working method that focuses on seeing various measures with a more long-term perspective in order to, e.g., organise construction processes and scale various measures to achieve good quality in the long term. These are working methods and approaches that actively encourage experimentation and the testing of new working forms and techniques. It is an approach that is close to an innovation perspective. Here, the focus is clearly on making changes in order to achieve better efficiency.

- Increased competition in the systems, in several respects – competition is a means that leads to a dynamic reconsideration of working forms, approaches and cost bases etc. Competition is perhaps in itself one of the clearest methods we know for bringing about continuous learning and development, and perhaps especially in complex systems, which are difficult to plan and coordinate in the framework of public planning systems
- Stronger efficiency incentives through earmarking and user financing – a part of an organisational or institutional framework that provides a solid foundation for an ongoing drive for efficiency in an organisation is, besides competition, to make organisations dependent on financing from those who use the services or systems. If those who use roads and railroads pay directly to the producing organisation, it will of course create a natural interest in adapting activities to demand and in, for example, managing maintenance investments so as to result in as few disruptions to customers (and thus minimal revenue losses) as possible. Earmarking also makes it possible to organise the systems so as to bring about a decentralised coordination of resources without an equally extensive need for planning measures in the public sector.
- A clearer incentive model can of course be sought in the context of a public tax-financed model if there is a consistent earmarking of tax revenues collected to a government agency, for example, from road traffic. This can be implemented as a “road fund” with an independent status in relation to the government's balance sheet. But this can of course also be implemented at other levels in the public system, in accord with relevantly designed responsibility for the activities and appropriate revenue sources.
- A regulatory framework to create openings for alternative financing, such as co-financing and PPP – limiting legal uncertainties and risks is important for being able to bring about more partnerships between the public sector and the private sector. A measure to produce such standard agreements is also something that reduces the transaction costs of this type of arrangement, which increases the opportunities of

implementing them. The measure can thus be said to lower the threshold for bringing about this type of development-oriented change

- Organisational changes – changes to the organisations that manage and operate the road and railroad systems are naturally a part of potential measures to bring about a more development-oriented infrastructure sector. These may be measures within the framework of existing organisations, where the formation of the Swedish Transport Administration could be seen as an example. But it can also relate to a more active pursuit of organisational forms that result in an emphasis on efficiency incentives. Here, there are several examples internationally, with alternative organisations for various individual projects and, e.g., corridor forms of organisation. There is, of course, a large number of such measures to consider, such as those based on the models for this kind of development as described earlier in this section. A more extensive regionalisation could be such a way forward.

Work is in progress on most of these various issues. One conclusion from the reform efforts of the last 20-30 years might be that measures focused on improving decision-making processes with a political and welfare economic agenda have drawn greater attention than the organisational reform efforts that create development and prerequisites. Recently, however, a major efficiency improvement project with a clearer agenda of this kind has been carried out at the Swedish Transport Administration. A part of this work is the ambition to develop forms of contracting and procurement expertise at the Swedish Transport Administration and with contractors in order to enhance efficiency and quality of supply.