Financing and regulating highway construction in Scandinavia – experiences and perspectives.

Svein Bråthen


ABSTRACT: This paper examines the costs and regulations concerning highways and motorways in the Scandinavian countries, both in an historical and a future perspective. Technical and financial information on the highway network is briefly presented. The Scandinavian countries have a quite similar regulatory regime. The national road authorities are responsible for planning of road investments and operations. The Parliaments are responsible for the final decisions on investments in the highway network. The construction and maintenance activities are done mainly on contract by private enterprises. Denmark has a couple of mega toll projects, like the Great Belt and the Öresund Bridge which have given opportunities for exciting regional development, but where there also is some concern with respect to risk and economic robustness. Norway has the largest number of toll financed projects. They count for around 25% of the road investments. None of them is in the mega class as single projects, but the toll financed investment packages in Oslo, and other larger cities are of quite substantial magnitude. Sweden has not used toll financing much. The only projects are the Svinesund Bridge (under construction) and the Öresund Bridge where the first is in collaboration with Norway and the latter in collaboration with Denmark. The toll fees are regulated by the authorities, to maintain public control over potential monopoly power in most of the toll projects. Public Private Partnerships (PPP) is not much used in any of the countries, but there are trial projects under way in Norway and considerable interest for this financing regime in Denmark. Sweden appears to be more reluctant towards the PPP arrangement.

1 Introduction

This paper presents the structure, the costs and the regulations of the highway system in the Scandinavian countries Denmark, Norway and Sweden. The presentation rests heavily on statistical information from the national transport ministries and public roads administration. The countries have to a variable extent data, maps and illustrations published on topics relevant to this paper. The scope of the presentation will therefore vary among the countries.

The countries are quite similar when it comes to the regulatory regime for highway investments and operations. Therefore, this regime will be described in a section that comprise all three countries, but where possible differences will be commented upon.

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First, the physical properties in terms of length of the road network will be described, together with a short description of the population structure. Second, the highway network, expenditure levels and regulatory frameworks for funding of road infrastructure will be described. Third, the role of private toll companies and the interplay with the road authorities will be discussed. Finally, perspectives for the future will be briefly discussed.

2 Population

A country’s need for road infrastructure is closely linked with its population size and how the population is structured geographically. Table 2.1 shows the population level in Denmark, Norway and Sweden in 2003.

<table>
<thead>
<tr>
<th>Country</th>
<th>Population</th>
<th>Population density (inhabitants/sq. km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>5,385,500</td>
<td>125</td>
</tr>
<tr>
<td>Sweden</td>
<td>8,940,800</td>
<td>20</td>
</tr>
<tr>
<td>Norway</td>
<td>4,552,300</td>
<td>12</td>
</tr>
</tbody>
</table>

Table 2.1 Population and population density

Denmark has a population density that is around twelwefold the density of Norway. The size and shape of a highway network is closely related to how the population is distributed within a country. The Scandinavian countries have a quite different population structure. Figure 2.1 shows the situation for Denmark and Sweden (and the other countries with EU 25).
Denmark is quite densely populated as compared to the rest of Europe. The largest concentration of inhabitants is in the Zealand/Copenhagen area and in the middle of Jutland and Fyn. The distances between these areas are rather short, particularly after the Great Belt link was finished in the late 90’s. In Sweden, the largest fraction of the population lives around Stockholm and Gothenburg, and in the southern region. Sweden’s regional policy in the 60’s did entail significant migration towards the urban areas. Figure 2.2 shows the population distribution in Norway.
Figure 2.2 shows that in addition to scattered settlements especially along the coastline, the main part of the population is concentrated around the greater cities of Oslo, Bergen, Trondheim and Tromsø. The Norwegian regional policy has been to maintain a distributed population. There is a number of reasons for that. Historically, it was necessary to keep up the regional development and settlement in the Northern part of Norway for military reasons during the cold war. In addition, Norway has a long coastline with fisheries and oil and gas related industry. Finally, there has been a political wish to maintain local communities based on agriculture. The particularly the latter is now under pressure both because the government wants to reduce level of transfers to the agricultural industry and because the globalisation and EC regulations makes it more difficult to protect this domestic industry. Today, there is a strong tendency of migration towards the regional centres and the larger cities.
3 Highway and motorway investments

3.1 Denmark

3.1.1 The highway network

Figure 3.1 shows the present road network in Denmark.

The length of the main arterial highways is 1660 km, while the regional road network is 10 000 km (secondary highways and county roads). Figure 3.2 shows the annual investments in the public roads network for the years 1976-2002.
Figure 3.2 Road investments in Denmark 1976-2002 (MEUR 2002)

The network was extensively upgraded in the 70’s and the beginning of the 80’s. The highways’ share of total public road investments is 35% on average, varying between 18% and 50% in single years. The investments shown above do not include the toll financed projects which will be described in Part 3.1.2. For the years 2004-2007, around EUR 80 millions per annum will be used for maintaining the 1660 kilometres of national highways. This is a significant upgrade as compared to the last few years (Trafikministeriet 2003). Total revenues from road user taxes (excluding tolls) were EUR 4.5 billions in 2002, whereof 32 per cent (EUR 1.4 billions) came from fuel taxes.

3.1.2 The mega toll financed projects: The great links of the Great Belt, Øresund and Fehmarn Belt

The construction of the Great Belt and Øresund links was funded by loans in Danish and international capital markets. The holding company for Great Belt A/S, A/S Øresund and Sund & Bælt Partner A/S is Sund & Bælt Holding A/S which is responsible for operations, maintenance and financial management of the subsidiaries. The Danish state acts as guarantor for the construction loans for the Great Belt project and for the Øresund landworks. The loans for the coast-coast facility at Øresund, including the immersed tunnel and the Øresund bridge are guaranteed jointly and severally by the Danish and Swedish states. These guarantees ensure a high credit rating and, therefore, favourable borrowing terms. On the other

2 Fact source: www.sundogbaelt.dk. The considerations are the responsibility of the author
hand, the incentives for the private lenders to ensure adequate payback may be weakened because of these state guarantees.

**The Great Belt bridge**

Construction costs for the Great Belt project totalled EUR 2.9 billions in 1988 prices (corresponding to approximately EUR 4.8 billions in 2002 prices). The road and rail link each account for roughly 50% of the overall costs. All construction costs, including interest, will be repaid from revenue from the link’s users, i.e. motorists and the Danish National Railways Agency. In 2002, motorists paid toll fees of approximately EUR 270 millions while the annual fee from the Danish National Railways Agency totalled EUR 80 millions.

At the end of 2002 Great Belt A/S’ debt were around EUR 5 billions, including interest. It can be seen that the link had a deficit with respect to user payments during 2002, with an increased debt of around EUR 200 millions.

Assuming a stable growth in traffic, continuing low interest rates and an annual adjustment of toll fees at the road link, the entire debt is expected to be paid by 2026, i.e. 28 years after the opening.

**The Øresund landworks**

The construction costs of the Øresund landworks total EUR 0.7 billion in 1990 prices (corresponding to approx. DKK 0.9 billion in 2002 prices). The landworks comprise the Øresund motorway and the Øresund railway to Kastrup airport.

The construction costs, including interest, will be repaid from an annual fee from the Danish National Railways Agency and from dividend paid by the Øresunds Bridge Consortium. In 2002 the fee paid by the Danish National Railways Agency amounted to EUR 11 million. The Øresunds Bridge Consortium has yet to pay divided.

At the end of 2002 A/S Øresund’s debt stood at EUR 1.2 billion, incl. interest. The entire debt is expected to be paid within a timeframe of 56-59 years.

**The Øresund bridge**

The construction costs for the Øresund bridge totalled EUR 2 billions in 1990 prices (corresponding to EUR 2.5 billions in 2002 prices.) The entire construction costs, including interest, will be paid by the users, i.e. motorists, the Danish National Railways Agency and the Swedish Banverket (the Swedish railtrack operator). In 2002 motorists paid toll fees of EUR 75 millions, while the fees from rail operators totalled EUR 53 millions.

At year end 2002 the Øresunds Bridge Consortium’s debt stood at EUR 2.7 billion, incl. interest. It can be seen that the link had a deficit with respect to user payments during 2002, with accumulated debt of around EUR 200 millions. The debt is expected to be repaid approximately 35 years after the inauguration of the bridge, i.e. in 2035.

**Funding**

The construction projects for Great Belt A/S, A/S Øresund and the Øresund bridge were financed through loans in domestic and international capital markets. The loans
are repaid from revenue from the Great Belt and Øresund bridges and from fees paid by the Danish National Railways Agency for the use of the rail links.

Loans taken up by Great Belt A/S and A/S Øresund are guaranteed by the Danish state. Loans taken up by the Øresunds Bridge Consortium (the legal entity which lends money to the Øresund Bridge) are guaranteed jointly and severally by the Danish and Swedish states. The Consortium’s loans carries an AAA-rating by Standard & Poors.

The Treasury Department at Øresunds Bridge handles the financing for Great Belt A/S and A/S Øresund (owned by Sund & Bælt Holding A/S). Bonds issued by these two companies are guaranteed by the Kingdom of Denmark and thus indirectly carries the same rating (AAA by Moody's and AAA by Standard & Poors).

**Fehmarn Belt**

Since 2001 the Fehmarn Belt division of Sund & Bælt Holding has acted as adviser to the Danish Ministry of Transport on issues relating to the construction of a fixed link across the Fehmarn Belt between Denmark and Germany. As such, the division has also been directly involved in the preliminary Danish-German preparations for the final political decision concerning a Fehmarn link. At a meeting in Berlin in June 2004, the Ministers of Transport of Denmark and Germany signed a joint declaration setting out a detailed framework for the further development of the fixed Fehmarn link between Germany and Denmark. The ministers agreed on a financing model comprising state-guaranteed loans. Further investigations will aim at clarifying whether the private element within a state-guaranteed model can be further strengthened, e.g. by transferring some of the financial risk to the private sector.

A cable-stayed bridge with a four lane motorway and two rail tracks could be a viable technical solution although an immersed tunnel is an alternative. The two ministers agreed that a detailed analysis should be carried out into environmental, safety and navigation issues before the technical solution is chosen. Both ministers emphasised that the joint declaration is an important step on the way towards a fixed link across the Fehmarn Belt. In 2002 the Fehmarn Belt Division, in conjunction with German partners, collaborated on an analysis of the private sector’s interest in participating in the construction and operation of a Fehmarn belt fixed link. The payback period and the robustness seem similar to the mega projects presented above.
3.2 Norway

3.2.1 The highway network

Figure 3.3 shows the present road network in Norway.

![The road network in Norway. Source: Statistics Norway.](image)

The red lines are the main arterial highways, while the thicker blue lines are secondary highways. The length of the main arterial highways is 7547 km (of which 178 km is motorways with 4 lanes or more), while the secondary highways are 19417 km.

A substantial part of Norway’s highway funds (25 %) comes from road tolls. These tolls are collected from cordon toll rings around the larger cities and from larger highway projects like fixed fjord links. Figure 3.4 shows the Norwegian toll projects in the highway network.
These projects count for 689.1 kilometres of roads (as per January 2003), and there is a further 59.5 kilometres under construction. There are 108 toll stations and a total of 340 toll lanes. Total toll revenue in 2002 was approximately EUR 380 millions. The accumulated investment level in toll roads in 2002 was EUR 615 millions. The cities (marked with dark blue) and the projects marked with red have automated toll collection systems. The other ones have other electronic or manual systems.

Table 3.1 shows the toll projects with toll collection periods and revenues.
<table>
<thead>
<tr>
<th>County/project</th>
<th>Opening</th>
<th>Revenues 2003 (MEUR)</th>
<th>Planned payoff year</th>
<th>Revised payoff year</th>
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<tr>
<td><strong>Østfold</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Hvalertunnelen</td>
<td>1989</td>
<td>3,0</td>
<td>2008</td>
<td></td>
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<tr>
<td>Østfoldpakka</td>
<td>2001</td>
<td>19,2</td>
<td>2016</td>
<td></td>
</tr>
<tr>
<td><strong>Akershus/Oslo</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Hovedvegutbyggingen</td>
<td>2003</td>
<td>130,4</td>
<td>2007</td>
<td></td>
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<tr>
<td><strong>Akershus/Oppland</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Rv4 Opland (Fase 1)</td>
<td>2002</td>
<td>1,4</td>
<td>2005</td>
<td></td>
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<tr>
<td>Rv35 Lunner - Gardermoen</td>
<td>2003</td>
<td>0,3</td>
<td>2018</td>
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<td><strong>Vestfold</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>E18 Vestfold</td>
<td>2002</td>
<td>16,4</td>
<td>2013</td>
<td></td>
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<td><strong>Buskerud</strong></td>
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<td>2000</td>
<td>10,6</td>
<td>2015</td>
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<td><strong>Aust-Agder</strong></td>
<td></td>
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<td>E18 Aust-Agder</td>
<td>2001</td>
<td>9,5</td>
<td>2015</td>
<td></td>
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<td>Rv 9 Setesdalen</td>
<td>2003</td>
<td>0,7</td>
<td>2018</td>
<td></td>
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<td><strong>Vest-Agder</strong></td>
<td></td>
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<tr>
<td>E 39 Lyngdal-Flekkefjord (Listerpakken)</td>
<td>2003</td>
<td>4,2</td>
<td>2017</td>
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<td>E18 Kristiansand</td>
<td>2000</td>
<td>11,2</td>
<td>2005</td>
<td>2007</td>
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<td><strong>Rogaland</strong></td>
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<td>T-forbindelsen</td>
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<td>Ryflykepakken</td>
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<td>2005</td>
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<td>Rv 519 Finnfast</td>
<td>2003</td>
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<td>2005</td>
<td></td>
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<tr>
<td>Nord-Jæren i Rogaland</td>
<td>2001</td>
<td>9,8</td>
<td>2009</td>
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<td>E 39 Bokn fastlandsforbindelse</td>
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<td>4,2</td>
<td></td>
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<tr>
<td><strong>Hordaland</strong></td>
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<tr>
<td>Bompengeringen i Bergen</td>
<td>2002</td>
<td>19,6</td>
<td>2011</td>
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<td>E134 Rullestadjuvet</td>
<td>2001</td>
<td>1,9</td>
<td>2015</td>
<td></td>
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<tr>
<td>E39 over Stord</td>
<td>2002</td>
<td>1,7</td>
<td>2008</td>
<td></td>
</tr>
<tr>
<td>E 39 Hundvåkøy-Hulterøy</td>
<td>2001</td>
<td>0,0</td>
<td>2003</td>
<td>Finished</td>
</tr>
<tr>
<td>E39 Trekantsambandet</td>
<td>2001</td>
<td>13,1</td>
<td>2016</td>
<td></td>
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<tr>
<td>E39 Nordhordlandsbrua</td>
<td>1994</td>
<td>14,7</td>
<td>2008</td>
<td>2006</td>
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<td>Rv551 Folgefonnaforbindelsen</td>
<td>2001</td>
<td>1</td>
<td>2015</td>
<td></td>
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<td>Rv566 Osterøybrua</td>
<td>1997</td>
<td>3,7</td>
<td>2014</td>
<td>2011</td>
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<td>Fv 207 Bjørgen</td>
<td>1996</td>
<td>0,8</td>
<td>2011</td>
<td>2004</td>
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</table>

*Table continued on the next page*
Table 3.1  Toll collection periods and toll revenues in Norwegian toll projects (2003). Source: Vegdirektoratet (NPRA).

Table 3.2 shows the public investment level in Norway for the years 1999-2003.

Annual expenses for maintenance and operation of the road network to maintain the infrastructure capital amount to approximately 30% above the annual investments.

Total revenues from road user taxes (excluding tolls) were EUR 4.7 billions in 2003, whereof 38 per cent (EUR 1.8 billions) came from fuel taxes.
3.3 Sweden

3.3.1 The highway network

Figure 3.5 shows the present road network in Sweden.

![Map of Sweden showing road network](image.jpg)

**Figure 2.4** The highway network in Norway. *Source: Vägverket, report 2004:93.*

The Swedish road network comprises 138,000 km of public roads, of which 98,000 km are national roads (SIKA 2003):

- The main arterial highways: 4,800 km
- National highways: 10,200 km
- County highways: 11,200 km
- Secondary county highways: 71,800 km

Total 98,000 km

For the years 2004-2015, annual average investment costs amounts to approximately EUR 540 millions. For the same period of time, the average annual maintenance and operating costs in the national road network amounts to EUR 715 millions. Sweden does not have toll financed roads except for the cross-border engagement with Denmark and Norway (the Öresund Bridge and the Svinésvarden Bridge, respectively).

The exact total revenues from road user taxes could not be obtained at the time of writing. The tax structure is however similar to those in Denmark and Norway.
The organization of the road planning regime is quite similar in the three countries. The public sector, represented by the national road administrations (NRA), is responsible for the planning, investments and operation of the national highway system. We will not examine the planning and decision-making process in detail in this paper, but pay attention to a few elements.

The NRA makes investment plans for the highway system. In Norway and Sweden, the regional level (the counties) submits priority of projects in the secondary system to the NRA, as a result of a political process. The NRA may overrule the regional priority lists, but as a rule they are followed and included in NRA’s road investment plan for each county. The main highway system is NRA’s responsibility, but the counties and municipalities are consulted when issues like land use and environmental issues are affected. In Denmark, the NRA is responsible for the interregional highway network (2% of the network in km (1660 km), 30 % of the road traffic). The rest of the network is left to the counties and the municipalities. However, the monitoring of the road system, collection of traffic data, R&D for road construction methods, regulatory issues and international cooperation are NRA’s responsibility.

Incentive problems concerning the public and private sector’s engagement in road planning are thoroughly discussed in Flyvbjerg et al (2003), particularly when it comes to large and complex projects. This topic will not be pursued in detail here. As seen from the previous presentation, there are different practices when it comes to the private sector’s role with respect to the use of toll financing and Public-Private partnerships (PPP) in the Nordic countries. Denmark has used full toll financing, private consortia and user payments with state guarantees in large projects. Norway has 46 toll financed projects in operation, and the number is expected to increase. With a few exceptions, the state has not provided any guarantees for the loans, but a system for risk management is established that provides the incentive to give careful estimates on the project’s payback ability. Sweden’s toll financed projects are cross-border projects with Denmark and Norway.

PPP are not commonly used in the highway network in Scandinavia. Denmark has one project under way, a highway project under South Jutland county jurisdiction. Norway has two pilot projects under construction and a third will soon be launched, under the jurisdiction of NPRA. Sweden has alternative financing models like toll financing and PPP under consideration for the highway system as well as for other parts of the transport sector. Up to now, all projects apart from the cross-border bridges are financed by state funds.

The Danish mega projects are described briefly above, and they are thoroughly referred to in Flyvbjerg et al (2003). Because of the relatively high number of private sector funded projects (at least partly) in Norway, the following section will deal with the Norwegian system for toll financing and PPP in some depth.
4 Toll financing and PPP in Norway

4.1 Policy overview

Norwegian road policy faces major challenges in the years ahead. Increasing maintenance costs for expensive road projects, greater focus on traffic safety together with lacking funds for realizing the political objectives for public transportation (especially in the largest cities), result in less public funds for road construction in the coming years. Along with that, traffic is constantly increasing and hence the need for new roads. The funding problem is not due to scarcity, but to the risk of overheating the Norwegian economy.

Facing these challenges, different measures are being suggested. In the largest cities, turning the present toll cordons into congestion pricing schemes is a matter of consideration, even if this is politically complicated. What increases the relevance of congestion pricing is that the Norwegian Parliament has passed an amendment to the road traffic act that allows congestion pricing to be implemented. An important fact is that the toll collection period for the toll cordons of Trondheim and Oslo (the Bergen toll cordon was recently approved for another 10 years) is coming to an end. The alternatives are now either to get rid of the cordons (presumably the most popular choice amongst the motorists), carry on collecting tolls as today or in a slightly different form, or to convert the toll cordons into congestion pricing schemes. Oslo will within a short period of time make a decision on this, and the most probable alternative is a stepwise introduction of a congestion charging scheme combined with an extensive upgrading of the public transport system.

Because of significant traffic growth in recent years, large parts of the national highway system are not suited for the levels of traffic currently experienced. Both this fact, and a need for better traffic safety, indicates that there is a need for an upgrade of the national trunk road system. The Norwegian Public Roads Administration (NPRA) has estimated that it will take approximately 30 years to develop the national trunk road system to an adequate standard within today’s financial limits. The ‘rural bias’ in the Norwegian Parliament also makes it less likely that road projects in rural areas will be sacrificed in order to increase the level of investment in the national trunk road system. In practice, Norway is therefore forced to consider other means of financing which means some kind of private sector involvement without overheating the economy.

The most obvious alternative is to expand the use of toll financing. Norway, with its long tradition for toll financing, has a strong and well-used organisational framework for this. It is now considered to use this tool to improve the national trunk road system. This could however turn out to be politically challenging. The opposition against road tolling is extensive in some areas, and even if road tolling is politically acceptable, the average Norwegian motorist is not in favour of road tolling.

In the present political climate, Public Private Partnership (PPP) therefore appears as an alternative. Norway is currently exploring PPP-financing in three pilot cases and the government is also considering using PPP projects on the rail network. The results of these pilot cases will be carefully evaluated. If one chooses to use PPP for

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3 Section 4 is indebted to Welde et al (2003).
4 The Norwegian road network is split between national highways (trunk roads) and secondary roads. National highways link together the different regions and may also be important roads within the region.
future construction of the Norwegian road network a combination of toll financing and PPP is possible.

4.2 The use of tolls

Toll financing has been used in Norway as a supplement to public funding for more than 70 years. The first modern road tolling project was the Vrengen Bridge in the early 1930s. Since then, over 100 toll projects have been realised successfully and only one has been declared as bankrupt.

Up until the late 1980s, toll financing was mainly used to finance bridges and tunnels. Nearly all the projects were located in rural areas. Since then the number of tolled roads and the amount of tolls paid have increased, and today some 25 percent of the annual funding of road construction comes from toll financing.

The increased use of toll financing is due to a number of factors, but traffic growth has nevertheless increased the need to invest in new and better roads. In the largest cities Oslo, Bergen and Trondheim, congestion led to the implementation of toll cordons in the years 1986 to 1991. The legitimacy of these cordons are for funding and not for traffic calming, even if there is a slight difference between peak and off-peak charges.

Today, there are 45 toll projects and the number of projects is increasing. Norwegian motorists used EUR 400 millions on road tolls in 2002, some EUR 165 per vehicle per year.

The revenues from the toll cordons make up the main part of the funds. Smaller projects in the rural parts of the country do however still make up the majority of the projects. The revenues are assigned to the specific project where the tolls are collected. In the coming years, NPRA wants to use road tolls as a strategic measure to upgrade the national trunk road system.

4.3 The organisational framework of Norwegian toll projects

The organisational framework of Norwegian toll projects has remained mainly unchanged since the start. It can be described as a bottom-up approach where local stakeholders are the promoters in most cases. Hence, each toll project is based on a local initiative. This initiative is usually taken by the business community, local authorities or even by individuals. Based on this initiative, a toll company is founded, usually organised as a limited liability company. This company must be jointly owned by local authorities affected by the proposed road project and must be organised as a non-profit enterprise. The toll company acts as an enthusiast and works to establish a political acceptance for the project. This process may take years and often includes lobbyism both locally and nationally. As the company has no source of income, this work will have to be financed through its equity capital. The business community in the area usually contributes with such capital. This is especially common in projects supported by a majority of the local community, especially bridges and tunnels replacing ferry services. When a majority of the local municipalities and the county municipality supports the project, it is being recommended to the NPRA. If the NPRA supports the project (which is usually done
if the county is in favour of the project, it is being presented for the Parliament. As all toll projects must be based on both local political consensus and a recommendation from the NPRA, the Parliament will in most cases give its approval.

Even if toll financing involves a strong public complicity through political acceptance and normally a conditional reimbursement for the loans, the toll company has to raise private financing. The conditional reimbursement procedure for reducing financial risk is discussed in Bråthen and Odeck (1998). Private financing takes place both as share capital and, in some cases, as investment capital for the road construction. The shareholders will not get any return on the capital employed. As the business community often will be heavily affected by toll financing in an area, their attitude towards a project will be normally be greatly emphasised by the political decision makers.

After the Parliament’s approval of the project, NPRA has the responsibility for technical and economical feasibility studies. The NPRA is also responsible for the implementation of the project, which is done by means of contractors after a competitive tendering process. The toll company shall only make the necessary funds available for NPRA through loan capital. The company has no formal role in carrying out the project. Even if tolls sometimes are collected before the new road is opened (e.g. on adjacent ferry connections), the basic principle is that the tolls are collected after opening. The loan is usually paid off over a period of 15 years.

The local toll company is responsible for the collection of tolls, but in several cases the toll collection is outsourced to commercial toll collection companies. The toll company remains responsible for the collection and remains the contracting party with the NPRA. The ownership of the road during the collection period remains with the NPRA and the role of the toll company, aside from being a player in the political process ahead, can easily be described as to raise the funds and pay them off. If the economy of the project develops in a favourable way, the toll collection will end faster than planned. The toll company shall be dissolved when the toll collection period is over.

The NPRA has an active role in following up the economy of the toll projects. It shall approve of the tolls and the discount systems and all changes in these systems. Furthermore; each toll company shall compile an annual financial statement on the development of the toll collection. The NPRA leads the development of new technological and organisational solutions for toll collection. This work has lead to the development of technological standards available to anyone who wishes to use them.

4.4 Experiences from Norwegian toll road projects

Even though a large number of Norwegian roads have been fully or partly financed with road tolls during the last decades, the Norwegian way of organizing and implementing toll road projects has been criticised. In a report in 1999 The Office of the Auditor General of Norway pointed out several weaknesses, such as financial management and the organization of the toll companies, and the apportionment of liability between the toll road companies and the authorities. Based on this report, the NPRA proposed changes in the current organisational framework.

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3 This is a simplified presentation of the process leading to a toll project being presented to the Parliament.
There is a project-specific relationship between a toll road project and a toll company, and the company is responsible for the economy in that particular project. This prevents that a good economic situation in one project can cover up a deficit in another, but even so it is not necessarily the most efficient way of collecting tolls. Similarly: higher revenue than expected from an increase in traffic and/or efficient management will lead to an earlier stop in the toll collection and a discontinuation of activities for the company. Conditions like these do not automatically give the right incentives for a more efficient management.

Differences with respect to toll collection efficiency exist. The operating charges’ part of the revenue varies from 5 percent to more than 35 percent, and the collection cost per trip fluctuates from EUR 0.13 to EUR 3.75. These observations illustrate that there may be undesirable differences, even if some of the differences have to do with scale effects.

The toll companies act on behalf of the public authorities, and the NPRA often wants to give directions to the companies, for example in designing particular fare structures or with respect to how they should manage the toll collection. However, since the toll companies are private limited companies, this has often proven difficult. The toll companies have developed an autonomy which in many ways has not been contested. The NPRA has now acknowledged the lack of proper regulation instruments, and also that the existing instruments have not been used sufficiently.

Efficient management and good solutions demands a high level of competence in all parts of the organization. Organizing based on small, limited and time-bonded toll companies makes it difficult to build up, train and retain competent personnel. If toll companies shall continue to be the chosen way of collecting tolls and financing new roads, there should be a change in the way toll road management is organized.

As a result, the NPRA has suggested that a public toll company should handle all toll projects on national trunk roads in the future. This could make it easier to finance extended parts of the roads, as opposed to today when individual and isolated projects lead to great variation in the standard of the road. It is suggested that NPRA can initiate projects on the national highways and that the present requirement for political consensus between the national and regional level will be omitted. It is expected that this arrangement will provide large-scale advantages and therefore more efficient management. Toll projects on secondary roads will still be organized as today. A decision is still to be made on this revision.

One matter of concern has been to what extent the possibility of private financing may influence the decision-making process, with respect to a couple of factors that will be commented upon in turn.

1. Does the possibility of wholly or partly private financing allow socio-economic unprofitable projects to be implemented more easily?
2. Does private financing alter the sequence of project implementations?
3. Are there any distributional consequences of private financing?

Bråthen and Odeck (1998) discuss how the interplay between local and central government combined with the option of private financing may explain why the actual ranking of projects is not in accordance with socio-economic profitability. The main reason why project rankings differ, may be found in the rigid structure of public road financing. A nearly fixed share of public funds has been allocated to each
county over a 20 year period, although the aggregate level of the public funds has decreased over the last years.

Projects are ranked within each county’s investment budget. Especially in rural Norwegian counties there has been scarcity of socio-economic profitable projects. Implicitly, there has been a strong political belief in road infrastructure as a mean for achieving regional balance because a good number of unprofitable projects have been implemented. Another explanation may be that in the period 1994-97 the counties competed for funds granted additional to the ordinary budget. These funds were allocated according to the projects’ socio-economic profitability and not from the historical distribution of funds among counties. This situation may have given incentives for the counties to use their profitable projects in this competitive situation and not in the ordinary ranking procedure. A third explanation may be that private financing with a little or no share of public money makes it hard for politicians to resist temptation to show their benevolence towards the desires of a local community.

There has been some concern about to what extent the options of private financing combines with strong local pressure for user payments contribute to locked-up processes which bind the Ministry and the Parliament in their proposals and decisions. Nyborg and Spangen (1996) have interviewed former representatives in the Parliament’s Committee for Transport and Communications. One of the claims was that private financed projects in Norway are often large and complex with a long time span for planning with a lot of work and money involved, and they benefit from articulated local enthusiasm. Thus, such essential features makes them difficult to reject. The toll financing options are considered as a particularly favourable factor when the projects are given priority in the decision-making process.

The distributional consequences may be twofold: First, the most apparent one is the effects for lower-income groups that have to use the road system frequently, e.g. younger families driving their children to the kindergarten. Second, if road financing is extensively used in urban areas and not used for regulatory reasons (e.g. congestion pricing), it may be considered as an extra tax for the urban population to release public funds for road building in rural areas. This may however be a rational tax object, if the demand elasticity of urban road use is low, although the “fairness criterion” may not be satisfied.

4.4 PPP - opportunities and experiences

In the 1970s, a drop in public budgets and an increased need for new investments led to a search for alternative means of financing in most countries. In many countries this made way for private sector involvement, through outsourcing or privatisation. Methods of private financing, building and management of public infrastructure made their break-through in the 1990s.

PPP describes different ways of public-private co-operations for development of different types of infrastructure. This implies that a private consortium builds, maintains and operates a specific road project. The payment consists of public funding, tolls or shadow tolls. A combination of public funding and road tolls is the usual payment. A shadow toll means that the company gets paid according to the number of passing vehicles.
A characteristic of PPP is that the financial risk is transferred from the public authorities to a private consortium for a period of 20 to 30 years. The consortium can get the ownership in this period, which will subsequently be transferred to the authorities. This means that the authority’s part in a PPP-project is limited to making the order, land acquisition and to supervise how the project should be carried out. Usually, the authorities take the political risk and possibly also the income risk. These elements are parts of the systematic (macroeconomic) risk inherent in the project, which means that these risk elements are beyond the contractors’ control.

4.4.1 PPP – advantages and disadvantages

PPP is considered to have two main advantages compared to traditional project financing:

- Value for money/increased efficiency
- Relieving public budgets

PPP can contribute to increased efficiency in several parts of the implementation process and thus deliver a project with the same quality as under conventional procurement for less money, or deliver a project with a superior quality for the same amount of money. Efficiency gains are linked to several aspects of the project.

One of the main reasons why PPP came into existence was cost overruns in public road construction and the fact that many projects were not being completed in time. In Norway, a study of the years 1992-1995 showed a mean cost overrun of 7.9 percent ranging from -59 to +183 percent. By giving a private consortium the responsibility for both financing and the carrying out of a project, this may lead to better incentives for a fast delivery of the project than under traditional procurement. The revenues of the private consortium are based on the completion of the project. The costs of a lengthy construction process will be highly visible through the interest rates. In order to generate revenue as soon as possible, the consortium must focus on a fast and cost-efficient construction process.

Public funding can be unpredictable as it is affected by the political process. A private consortium can arrange for an ideal supply of capital in correlation with a rational construction design. One of the reasons why public lead projects have experienced cost overruns is alteration of the project design during the construction, often as a result of political interference. With PPP, a significant amount of responsibility will be transferred to the private sector. The authorities will be forced to specify the contents of the contract with respect to both the infrastructure and the quality, before the tendering process. On the other hand, PPP may imply reduced flexibility with respect to the possibility of making benefits from e.g. technical innovations and additional information on e.g. environmental issues.

In traditional projects, building and maintenance operations will normally be separated into two different contracts. This implies that the one responsible for the maintenance will have no opportunity to influence the design of the road. On the contrary, PPP is based on the same entity being responsible for both the construction and the maintenance. The revenues are based on the consortium complying with a certain level of service and hence having few incentives to reduce the level of service provided. The consortium must consider which technical solutions that will give the lowest life time costs. This contractual structure will reduce incentives to overrun
costs or to choose an inefficient technology, since the operator’s future revenue depends on a flow of suitable quality services.

Several aspects of PPP can however lead to higher total costs than traditional projects and thus giving poor value for money. PPP projects are extensive and the transaction costs will normally be higher than under traditional procurement. Furthermore, the private consortium will need to raise a loan to finance the entire construction and pay off this loan over a longer period. A private consortium will need to calculate a risk premium in the estimated price of the contract. This could in term prove to be more expensive for the public authorities. Compared to public funding discounted over a short period, the PPP model could imply higher total costs unless the advantages of PPP outweigh the disadvantages. This remains to be seen.

The length PPP-contracts will normally be between 20 and 30 years. This means that there so far has been few, if any, opportunities to evaluate the projects at the end of the contract period. In Great Britain five projects have been evaluated by the Institute for Public Policy Research at the signing of the contract (Aas 2003). The savings compared to traditional projects varied from a gain of around 30 per cent to a loss of around 20 percent. However, the conclusion was that the gains were uncertain and it was too early to conclude whether PPP will give added value as compared to traditional projects.

There are a number of circumstances that may affect the functionality of the PPP contracts. First, total contract costs may increase in the future as a result of strategic behaviour. One thinkable example may be that the contractor attempts to replace investment costs with future more expensive maintenance costs. Maintenance costs (e.g. replacement of vital technical equipment) can often not be neglected, and the authorities may thus be forced to renegotiate the contract. Another uncertainty is connected to the stability of the private contractors under long-term contracts. Bankruptcy, M&A and flagging-out are factors that may cause regulatory problems.

Large and extensive PPP projects demands a competent organisation and a solid financial basis. When a private company enters a tendering process, it has to consider the possibilities for not being granted the concession and have no options for covering the tendering costs. Because of these uncertainties and also the size of the Norwegian contractor market (the barriers to entry are presumably higher for foreign companies), the number of bidders may be limited, thus reducing the competitiveness. Regardless of the number of bidders, PPP in itself can lead to reduced competition, since the company who gets the contract will basically have a monopoly during the contract period, which may give incentives to a demand for contract renegotiations particularly if the revenue side develops adversely e.g. because of an economic downturn. The authorities are bound by the contract, and will hardly profit by efficiency gains unless the contract is designed for splitting the benefits between the operator and the authorities. It is presumably very important for PPP success that the authorities gains deep competence as a buyer of these services, and that the contracts are designed with the necessary flexibility and the right incentives.

As for toll financing, PPP will contribute to relieve public budgets. This is important for countries with limited resources or for countries like Norway who has the funds available but with little possibilities of increasing the public budgets since the economy is close to the limit of capacity. A discharge of public budgets will also release capital to other purposes than transportation. On the other hand, extensive use of PPP-financing will commit future Parliaments economically and hence reduce
future degrees of freedom with respect to policy design. In Norway, the three pilot PPP projects are expected to bind about 10 percent of the road investment budget for the years 2006-2012. An increase in the number of PPP projects today can therefore add power to today’s Parliament on expense of future Parliaments.

4.4.2 Combining the experiences from toll financing with PPP

PPP has obvious similarities with traditional toll financing. Toll financing has proven to be successful as over a hundred projects have been financed using tolls. Nevertheless, there are a few problems which need to be addressed.

PPP projects do not necessarily need to be financed using road tolls; they can very well be financed using public funding or shadow tolls. The purpose of toll financing in PPP projects is the same as in traditional toll projects: to allow public money to be used for other purposes and to let the private sector take a bigger responsibility for road funding at the same time reduce the risk of overheating the economy. PPP will relieve the public budget in the short run, but public payment will be needed over a longer period. Tolls will, on the other hand, unload the public budgets over the entire contract period since one fixed share is paid by the motorists. From a socio-economic perspective, tolls could lead to less efficiency due to traffic deterrence and costs of collecting the tolls. If these costs are higher than the cost of collecting taxes (in Norway estimated to 20 percent) it is more efficient to finance the project through public funds.

4.4.3 Risk management

A main objective with PPP is to transfer parts of the economic responsibility (risk) from the public authorities to a private consortium.

The authorities do not have an economic profit motive. It is a common assumption that participants with non-profit motives have better chances to reduce costs and/or maximise the revenue. This applies only when the private consortium has an opportunity to influencing the risk. Hence it will be important to identify the risk elements and to determinate whether the public or private sector is most qualified to handle them.

A transfer of risk means that the private consortium has to finance the project. The finance costs are normally higher for a private company than for the public authorities. Therefore, the efficiency improvements during construction and maintenance operations have to be measured against the company’s higher finance costs.

However, it is important to remember that the public sector cost of funds is significant because funds are locked in the same way as for a private company. The difference is that the public authorities is considered as a secure payer who can borrow, for example from itself through an advance of future income, to a nearly risk free interest rate. This is particularly interesting for countries like Norway, with surplus budgets. It gives a better scope of manoeuvring than countries with deficiency on their central government finance.

In comparison, the private company has to calculate a risk premium in order to take responsibility for the risk through the contract period. The risk and risk premium will increase if the private company has to handle both the cost and the income risk. If the
private consortium is to handle the income risk, it has to collect the tolls and take the risk of negative traffic development. A main argument for transferring the income risk to the private company is that they get incentives to provide the motorists with good services. On the other hand, the private consortium usually has little or no influence on the traffic development which generally depends on the macroeconomic development and other circumstances outside the company’s control e.g. projects in adjacent areas that may affect the traffic flows. This may be a common case in urban transport, where both road and public transport projects may influence the traffic flow.

One possible solution is that neither the company nor the public authorities take the income risk. This can instead be left to the motorists. One way of doing this is to define incremental and sequential parts of a larger project that is supposed to be paid by tolls (e.g. in urban transport systems where a PPP package can be ‘sliced’), and thereafter let the market to decide the total size of the project.

Tolling in Norway is subjected to extensive regulations, a fact that limit the toll company’s (or the PPP company’s) possibilities to influence the revenue. If the economy of a toll project becomes weaker than expected, the NPRA can allow the tolls to be increased up to 20 percent in addition to the general inflation. If this is not sufficient, the toll collection period can be extended with up to 5 years. Beyond this, there are no remedies that can increase the revenue, except efficiency improvements. If a Norwegian PPP-project shall be partly financed through toll collecting, it has to follow the same regulations as the other toll projects.

Under the current policy framework, the arguments mentioned above leave relatively few degrees of freedom for the companies that involve themselves in PPP. This may indicate that the income risk in Norwegian PPP projects should only to a limited extent be part of the contract. The consortium should rather be paid directly from the public authorities. Prospective toll collection arrangements should be organized in the same way as traditional toll projects, with the authorities as the responsible player. This will lead to reduced risk in the PPP-contracts and the private consortium will presumably require a lower risk premium.

4.4.4 PPP and non-profit organization

It might be difficult to understand why private companies and individuals want to spend efforts on toll projects without expecting any earnings. The answer lies in the considerable transport costs in Norway. While the costs of transportation in Europe are 2-2.5 percent of total sales on average, the corresponding numbers for Norway is around 8 percent. The reason for this is partly due to long travel distances, but infrastructure characteristics and difficult external conditions is also a part of the picture. However, one should be careful not to let the financing possibilities overrule the main economic decision-making criterion, namely whether the project is socio-economic profitable or not. The perceived lack of adequate infrastructure often makes Norwegian business community eager to contribute to road investments that can reduce transport costs, as discussed above.

To meet these challenges, one can develop a PPP-model based on the existing road policy framework and traditions. Some parts of the business community in the western parts of Norway have taken the initiative to a new collaboration model based

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6 As an example; there are over 100 ferry services in Norway. The motorists spend some 190 000 euros on ferry fares per year.
on Regional Public Private Partnership (RPPP) for improvements along the coastal national trunk road, the E 39.

RPPP requires a regional consortium, owned by the regional public authorities and by private interests. The consortium will be a non-profit company and will get its concession from the NPRA to finance, collect tolls, project, build, conduct and maintain the project. The revenues of the consortium are based on public funding and toll financing. The public authorities would then be able to reduce the short-term financial strain, and to have road projects implemented faster than they normally would. The NPRAs part in RPPP would be to organize the project through land acquisition and land use planning, approve of contracts with the contractor and to supervise the project. This model will lead to more involvement for the authorities than in traditional PPP projects. RPPP will reduce the public authorities’ risk as compared to traditional project financing model. The authorities transfer the largest risk to the company, which can carry out the project itself or distribute it to sub contractors.

A regional PPP-model combines Norwegian and European models for building new infrastructure. The public budgets are relieved and the road authority is ensured control through part-ownership in the company. In this way, the business community and the local authorities may create a partnership for faster building of the roads in the region, which can lead to future gains for all parties. Again, an important element in this model will be to let socio-economic profitability be the main investment criterion.

The main difference between an RPPP model and a traditional PPP model is that the RPPP-company is based on non-profit operations. Whether this model turns out to be less expensive or not, depends on how profitable a traditional PPP-contract is.

As opposed to traditional PPP-models, an RPPP-model will lead to less competition since the competitive bidding will be only on sub-contractor level. When the public authorities give licence to a regional company who is willing to lead the project without a profit requirement, there will not be a rival company who has a lower price. An RPPP-model is therefore in some ways like a traditional toll project, and one can get the same incentive problems as with toll financing. Whether a traditional or regional PPP-model is chosen, depends on whether the advantages with joint responsibility, shorter building period etc in RPPP-projects cancels out the drawbacks of less competition. In any case, a RPPP solution will relieve the public budgets in the short run, and at the same time ensure public control through part ownership.

Two PPP pilot projects have started and one more is under way. NPRA do not want to start more PPP projects before there has been a thorough evaluation of these pilot projects. Which model(s) that may be used in future PPP-projects is yet to be decided upon.
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