Toll financing of roads – the Norwegian experiences

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Abstract

The objective of this paper is to investigate what the future offers with respect to toll financing of infrastructure projects, based on Norwegian experiences. Specifically, we; (1) address the success of the Norwegian toll systems by looking at the organisational and the decision making framework; (2) examine users attitudes towards the tolls and factors determining them; (3) finally, in the light of the changing political environment and reforms being made in others areas of transport policy, we address the issue of how toll financing of road infrastructure can be designed for future projects. The tentative results of this paper may be summarised as follows:

i. In urban areas where air pollution and noise nuisance from road traffic are a problem, the cordon tolls can easily be adopted to the principle of congestion. Such a move will generate benefits greater than those attainable with the current cordon tolls.
ii. In the light of increasingly scarce government funding, the share of toll financed non-urban road infrastructure projects will increase. A possible implication is that, for a continued success, a new model integrating the private sector needs to be developed. One such a model is the increased Private Public Partnership model (PPP).
iii. In order to achieve more successful toll systems, users should be involved and informed at earlier stages in the planning process. This implies that considerable marketing efforts of tolls and/or congestion pricing prior to their implementation, is necessary for the significant majority of the public to accept them as a tolerable transport financing policy.

INTRODUCTION

Toll financing in the traditional sense has successfully been used in Norway as supplement to government funding for over 50 years. The use of tolls as financial instrument for road construction has increased considerably in the last two decades. Today, a good 25 percent of total annual budget for road construction comes from more than 30 road projects scattered throughout the country.

Tolls are used to finance both urban and inter-urban road projects. In the three largest cities of Oslo, Bergen and Trondheim cordon tolls are the main financial source of road, and to a certain extent, public transport investment programmes. In the non-urban areas, toll financing are used for road investments only. To date, about 100 toll projects have been realised successfully and only one has ever been declared bankrupt.

Given that tolls have been practised for so long time, a question that is readily addressed is whether toll financing of Norwegian road projects are expected to exist also in the future in their current forms. There are several reasons that validate this question. First, those against tolls contend that users are never consulted in the planning process and that if users attitudes were to be taken into consideration, very few tolls would have been built. Second, especially in cities, congestion is a well-known problem and a major issue for general public concern. Consequently, it is an important item on the political agenda. Congestion imposes not only a social cost but also a major social cost. It may be argued that transforming the current cordon toll system into a congestion pricing scheme holds a great potential for easing traffic congestion and improving the environment.
Third, critics have raised the issue that there may be other cost-effective ways of financing road infrastructure such as Public Private Partnership (PPP).

The primary objective of this paper is to investigate what the future offers with respect to toll financing of infrastructure projects. Specifically, we address the following issues: (1) the success of the Norwegian toll systems by looking at the organisational and the decision making framework, (2) examine users attitudes towards the tolls and the factors determining these attitudes, (3) explore the potential for socio-economic benefits that may be achieved by transforming the current tolls system into more road pricing oriented scheme and (4) in the light of the Public Private Partnership trends observed in Europe we investigate whether there any potential for efficiency improvement in toll financing in Norway.

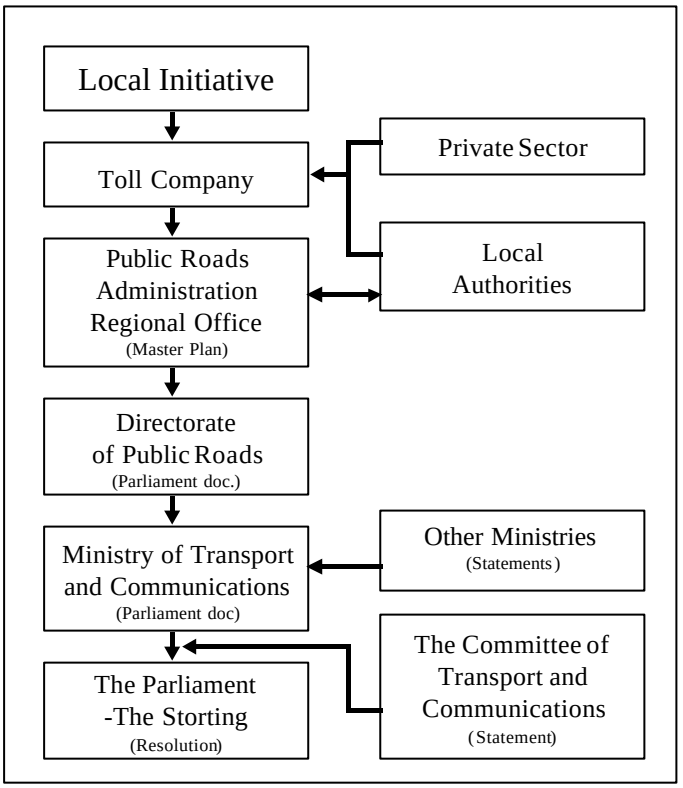
1. THE SUCCESS OF NORWEGIAN TOLL RINGS LIES IN THE ORGANISATIONAL FRAMEWORK

The success of the Norwegian road toll systems may be accredited to its organisational framework. The major reason behind toll financing in Norway is that projects get realised at a much earlier stage than would be the case with government funding alone. The organisational framework is such that The Norwegian Public Roads Administration is responsible for the planning, construction and maintenance of road projects financed by toll revenue. It is also responsible for the planning and building of toll collection systems. For each individual toll project, the local authorities and private interests establish a dedicated toll company, organised as a limited liability company. The main objective of the liability company is to operate the road toll system and to administer the toll revenues. The Ministry of Transport and Communications establishes operating regulations. As such, a toll company is an idealistic, non-profit enterprise. Engagement in such an organisation is not motivated by profits, but by the wish to see that a road project is built. Investors receive no share dividends.

It may be hard to believe that private involvement is possible given the above principles. However, toll financing has to be seen in connection with the local initiative that is present in all toll projects in Norway. Usually, the counties and municipalities affected by the road construction work, control the toll company as owners. This public ownership derives from the fact that most roads financed through toll revenue involve public funds on the expenditure side, and typically the local authorities are guarantors for the loans taken up. The counties and municipalities are motivated by the desire to see a road project carried out, a project that may not have been realised without road tolls. Through the collection of supplementary toll revenue, local authorities can get "their project" on the priority list for national highways. The willingness to raise extra private funds often means extra government funds for that region. This desire for extra government funds leads to local political pressure against both local and central decision-makers. The organisational framework of Norwegian toll companies is shown in Figure 1. Thus the key aspects of toll road projects are summarised as follows:

- Toll projects are based on local initiatives and local political agreement
- A two step political process is followed when proposing toll projects:
    - A principal acceptance of toll financing
    - Approval of financing scheme incl. possible guarantees
- All projects must be approved by parliament
- A non-profit company runs, operates and manages the toll collections.
- The tolls and the discount systems are approved by the Ministry.

Figure 1: The organisational framework of Norwegian toll initiatives



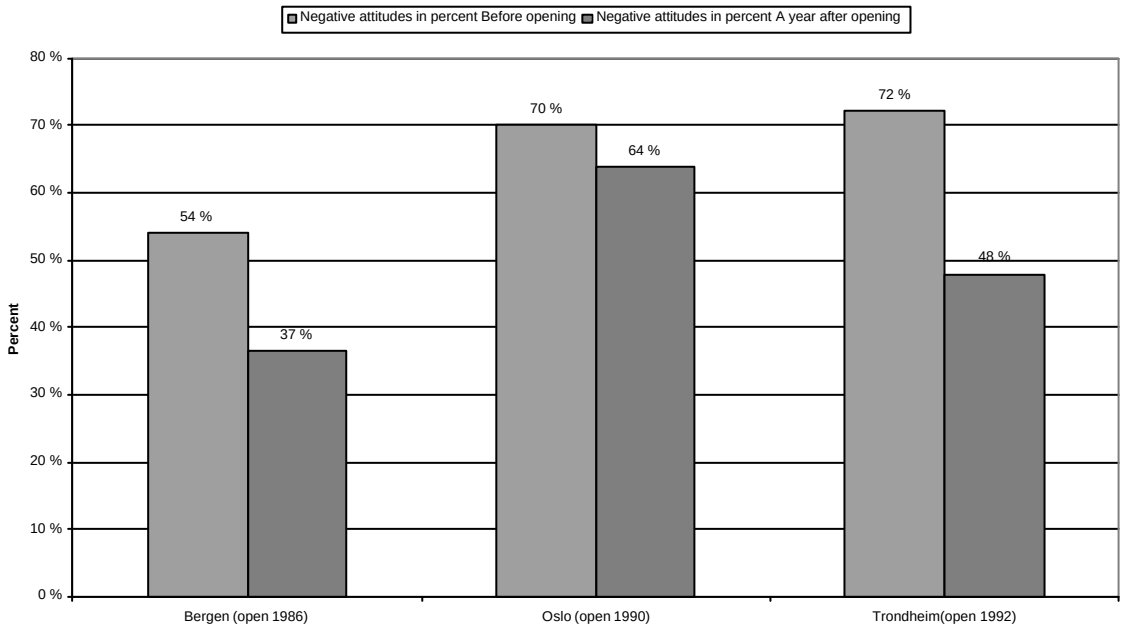
The organisational framework described above has also some inconveniences that should be pointed out. One area is the role of planners in the process in relation to politics and political pressure. Toll road projects are locally initiated. One result of such a local initiative is that the local Roads Administration is subject to local political pressure and therefore may recommend projects to the central road authorities that otherwise may have not passed the economic profitability test. Such projects may in the long run encounter financial problems. The local political authorities often make statements based on too optimistic assumptions, resulting in even greater political pressure. Problems also arise from the long period that passes from when a project is forwarded until it is accepted or rejected. Several assumptions are likely to change within this time, and updating and/or recalculation will need to be done several times. This is a costly and cumbersome process. The result of these delays might be that political decision-makers develop sympathy for a weak scheme that has been pending for a long time. In the same token, some planners may develop sympathy for the project and therefore help it pass the test. However, there have quite recently been some bad experiences with projects that have not been able to meet their financial responsibilities, which have sharpened the planner's attention towards these matters. As a consequence of these problems, a model for *conditional reimbursement* have been used as a vehicle for risk sharing between private agents and the authorities. These agreements have been framed by the Ministry of

Transport and Communications as a way of providing local guarantees within adequate financial limits. The basis for such agreements are that both the project and the model for private financing are approved by the local public authorities. For further details, see Bråthen and Odeck (1998).

2. USERS ATTITUDES TOWARDS THE TOLL SYSTEMS

Decisions on infrastructure projects often are carried out after a comprehensive public debate, especially when involving user payments. With respect to what the future may offer, useful insight can be gained from studying public attitudes and responses to toll financed roads. Since toll projects are sanctioned by the political system, there are reason to believe that politician will be more likely to sanction popular projects as compared to the less popular. Positive attitudes will indicate the degree to which the users are satisfied while negative attitudes will reveal dissatisfaction. In conjunction with the implementation of Cordon toll rings systems in the three largest cities of Bergen, Oslo and Trondheim user attitudes surveys towards the toll rings were conducted one year before and one after opening of the rings. Summary results of the survey studies are presented in Figure 2.

Figure 2: Users attitudes before and after opening of urban tolls in Norway



A common feature of the results in Figure 2 is that people become less negative to tolls a year after implementation as compared to a year before

implementation. There are remarkable differences between the three cities regarding the users' attitudes to tolls. One year after opening the percentage of negative user reduced from 54 to 34, 70 to 64 and 72 to 48 in Bergen, Oslo and Trondheim respectively. A reasonable explanation is that before opening, people are less aware of the positive impacts of toll financing and hence reacts only to the expected economic burden. For the cases studied the following were noted for each of the cases:

1. The Bergen toll ring became very popular among users due to its cheapness (only NOK 5) and its expected ability to finance the much-needed infrastructure in the sloppy Bergen City.
2. The Trondheim toll ring, with experience from Bergen and Oslo on user attitudes, was accompanied with promotional campaigns on its ability to finance infrastructure in the city at its initiation.
3. The Oslo toll ring at its introduction was relatively expensive (10 NOK) and there was no particular campaign as to its viability before opening and a year after the opening.

The attitude study for the Oslo case is conducted annually since 1989. A recent study on the trends of attitudes for Oslo with data from 1989 to 1995 revealed that the gap between positive and negative attitudes towards the toll ring was narrowing; by 1995 the figures were 55 negative and 45 positive (Odeck and Bråthen 1997). Thus conclusions pertaining to user attitudes of toll road with respect to the future are as follows:

- Make the public aware of the intentions concerning tolls *ex ante.* In the Oslo case it was observed that many users in the earlier years thought that tolls were being levied primarily to reduce the level of traffic entering the city. Once it became clear that funds were being used for road construction, by seeing actual construction in progress, their attitudes changed to more positive.
- Enhance acceptability by demonstrating the advantages of toll schemes in relations to other options. In the Oslo case, users were not informed clearly that tolls were the only option left to realise the much-needed capacity in the short term as government funding would not be available in a foreseeable future. In the Bergen and Trondheim case this issue was well addressed.
- Toll should be treated and marketed as a wider part of an integrated transport planning measures. In the Oslo case, the possible consequences for public transport could have been described to the public. In fact, about 10 percent of toll revenues from the Oslo toll ring are used to improve the public transport as a cheap and sustainable means of transport.

A conclusion that may be drawn here is that a lot of resistance to tolls originates in lack of information, little insight and bad history such as charges are not

removed once installed even when the roads are paid for. These issues often result in lack of public confidence, which in the future should be taken seriously.

4. THE POTENTIAL FOR SOCIO-ECONOMIC BENEFITS OF TRANSFORMING THE URBAN TOLL RINGS ROAD PRICING SCHEME

Congestion is a well-known problem in many modern cities and a major issue for the public, and consequently an important item on the political agenda. Congestion imposes not only a private cost but also a major social cost. Other things equal, congested traffic produces more air pollution, increases travel time and consumes more energy than a smooth traffic flow. The Norwegian cities, especially Oslo, are no exception in this respect and air pollution from road traffic is a problem in parts of the city. The severity of the problem varies with space and time. The problem is amplified under certain weather conditions and maximum concentration of pollutants may grossly exceed international recommendations. Much of the attention of transportation policy makers and planners has in the recent years been focused on means to alleviate congestion in the city. Previous studies (Larsen1993 and Larsen et al. 1996) have shown that an average motorist in Oslo city does not fully pay for the externalities that he/she cause to his surroundings. The cost elements not covered are mainly congestion costs – representing delay to others who use or interact with the network, but also some elements of air pollution and accidents.

Thus the question that should be raised with respect to the future is how to deal with these ever increasing environmental problems within the existing toll rings. One possible solution is to use pricing mechanisms that have for long been advocated for in economic theory. There is one practical reason why the Norwegian cities are special with respect to using pricing mechanisms to combat the externalities mentioned above. There are already well established cordon toll ring systems around the cities, the main purpose of which is to generate funds for road investment. Thus the next question is whether these toll rings can be transformed into more road pricing oriented schemes without conflicting with the current road financing schemes.

An evaluation of the viability of transforming the toll ring into a road pricing scheme should specifically address the following issues: (1) The environmental improvements that could be achieved and their magnitudes, (2) The magnitude of revenue that could be collected using the different systems, (3) The impact on public transport and (4) the overall socio-economic impact of a move towards road pricing.

In a recent study, Odeck et al. (2000) investigates the potentials of transforming the toll ring in Oslo into a congestion pricing scheme as addressed above. The results revealed that transforming the current cordon toll system into a congestion pricing scheme holds great potential for easing traffic congestion and

improving the environment. Further, it will improve the efficiency of both public and private transport while at the same time raising toll revenues substantially when compared to the current situation. Thus, such a move will not be in conflict with the present scheme. Figure 3 presents the socio-economic impacts that can be gained by three alternative road pricing strategies. The different alternatives represent the pricing alternatives to be implemented, and are defined as follows:

Alternative 1 (A1): The toll charges are differentiated over the three hours in the morning and afternoon rush with NOK 20, 40 and 30 respectively. The toll in the mid day periods (incl. Saturdays) is assumed to have the same level as today i.e. NOK 9. Between 6 p.m. and 6 a.m. on working days and in low traffic periods in weekends, the passing is free.

Alternative 2 (A2): Same as A1 but with lower charges at NOK 15, 35 and 25 in the rush hours respectively.

Alternative 3 (A3): A flat rate at NOK 25 in the peak periods, otherwise same as A1.

Alternative 4 (A4): Same as A3 but with free passing on Saturdays as well.

With reference to Figure 3, a conversion to road pricing in Oslo will:

(i) Raise the revenue substantially as compared to the current situation. This is because in a congestion pricing regime, the peak traffic is taxed more in line with marginal cost pricing as compared to the current situation where peak traffic contributes only one-third of the total revenue collected.

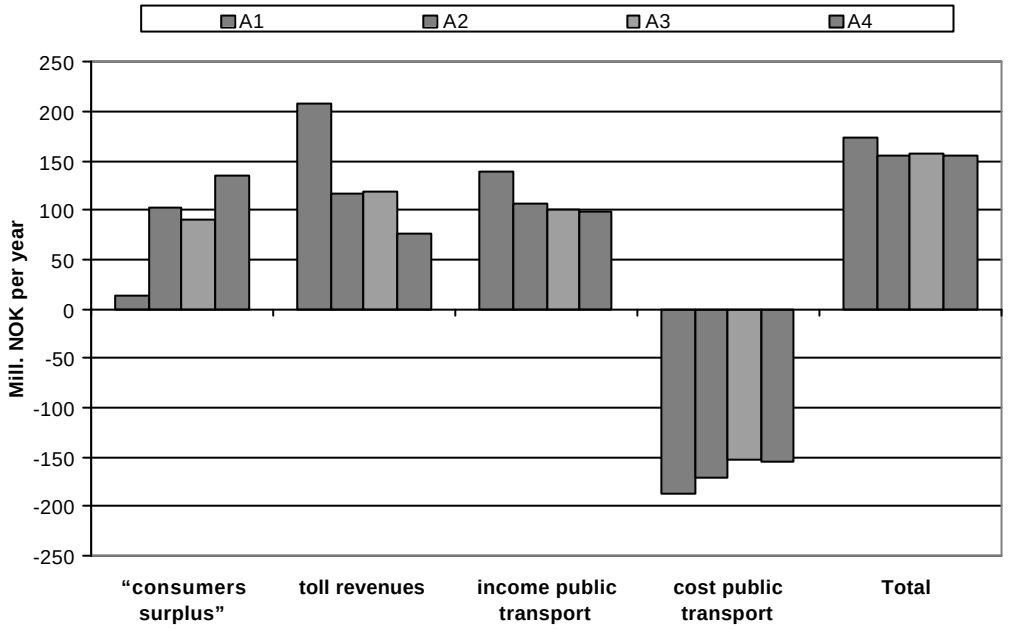
(ii) Optimal congestion pricing increases the costs of passenger vehicle use and therefore reduces the traffic volume. This in turn increases demand for public transport as well as reduces travel time for the remaining traffic. Increased demand for public transport implies increased income for public transport. Arguably, congestion pricing leads to an improvement in environmental conditions as it reduces passenger vehicle traffic.

(iii) Even though the cost for public transport will increase due to investments in new material to cater for the diverted road traffic, the sum of consumer surplus and income to public transport will be large enough to offset it. Thus the total social benefit for moving from cordon toll to congestion pricing will be greatly positive.

Thus the future of the current toll rings in the congested Norwegian cities lies in transforming them so as to combat the environmental problems in these cities. These transformations will not mean implementation of 'full' road pricing

schemes but constitute feasible approximations with modest extra transaction costs. Such approximations may be easier acceptable to the general public. In terms of marketing road pricing as outlined in section 2, one way of demonstrating the positive impacts of congestion pricing would be by trying it out as a case example. In this respect Oslo is a suitable case.

Figure 3: Potential socio-economic impact of alternative congestion pricing strategies in Oslo



5. DOES PUBLIC PRIVATE PARTNERSHIP (PPP) OFFER ANY POTENTIAL FOR EFFICIENCY IMPROVEMENT IN TOLL FINANCING IN NORWAY?

Public private Partnership within the road sector has been tried with much success in some European countries. PPP implies a contractual venture between the government and a private consortium, where the private consortium undertakes financing, construction, operation and maintenance of road projects. The contract for operation and maintenance is normally limited to about 20–30 years. After the contract period the operation and maintenance goes back to the public authorities responsible. The major difference between PPP and the Norwegian model for road construction, operation and maintenance may be characterised as follows:

6. Private sector gets full responsibility in delivering road services, while in the Norwegian model the private sector are subcontractors delivering pre-specified services in smaller scale.
7. The private sector bear the risk pertaining to cost overruns and enjoys the profit of cost "under-run". In the Norwegian model all risks are borne by the public agency responsible i.e. the government.
8. Under the PPP the public sector is no longer the provider of services but becomes the *procurer* who sets demand on what is to be delivered and not how it should be delivered.
9. Private sector has the responsibility for financing the delivery of transport services while in the Norwegian model either the government finances the project through the state budget or a loan is taken as in the case of toll projects where many toll companies are state owned non-profit organizations.

Considering the points above it becomes obvious that are both disadvantages and advantages associated with moving to a PPP model as compared to the current Norwegian model. The most transparent advantage with PPP pertains to the potential of increasing the socio-economic benefits. The source of socio-economic benefits is that competition in order to maximize profit offers an indirect incentive for cost-effective production of services, innovations and not the least, risk minimization as compared to a (public) monopoly.

PPP implies that tasks that are currently performed by the public sector will be tendered on competition in the private sector. However, in order for competition in the private sector to give returns in form of lower cost of production there must be more than one producer wishing to offer its services. This is most likely to be a significant problem in Norway, a small economy where the number of actors is likely to be small at least in a larger part of the country. In urban areas the potentials for proper competition are definitely there.

Turning to the disadvantages, PPP may lead to increased cost of projects. The reason is that the private sector will most likely operate with a higher risk premium than that which is relevant from a socio-economic point of view. Public sector normally operates with a premium lower than the private sector. Generally, the financial cost for a private consortium will cover the investors' risk for not getting the expected return in case things go wrong. In addition, PPP may entail larger transaction costs as well as costs associated with failure to complete the contract, which among other things may be due to bankruptcy.

Whether the advantages of PPP will be greater than the disadvantages are difficult to judge. However, much can be influenced through contracts. It has worked elsewhere with great benefits. Norway is a special case due to some of the reasons named above. The road authorities may however benefit from vast experiences and knowledge related to large contract systems in the oil and gas-

producing sector in this country. Our main conclusions, similar to those that have been drawn by the government, is that PPP needs to be tried out in a few "case projects" in order to explore its viability in the road sector.

10. CONCLUDING REMARKS

This paper has explored what the future may offer with respects to toll financing of road infrastructure investments in Norway. Although toll financing has been successful, there are potential for improvements in certain areas. This is mainly due to the fact that the surrounding in which transport takes place is constantly changing. We have thus identified areas where improvement needs to be made in order to adapt to these changing circumstances. Our findings may thus be summarized as follows:

(i) The public needs to be more involved in the planning process prior to the implementation of toll systems. Treating tolls as wider integrated parts of the transport systems can enhance the public acceptability of toll projects. Marketing of tolls should involve demonstrations of the advantages and disadvantages as compared to other options available.

(ii) Urban areas are increasingly experiencing environmental deterioration due to motor vehicle traffic. The urban tolls rings in Norway offers a great potential for using pricing mechanism to combat these environmental problems. Remarkable socio-economic benefits may be gained by converting the current road financing oriented cordon toll road congestion-pricing scheme without necessarily getting into conflict with the funding aim of current systems.

(iii) There are potentials for socio-economic benefits to be gained by introducing the Public Private Partnership model in the Norwegian transport sector. However, this type of cooperation may also lead to increase in costs. It is also important to ensure full competition among the potential operators. In order to explore the benefits of PPP over the current system, case projects should be initiated to try out the PPP concept.

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