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Why don't cost-benefit results count for more? The case of Norwegian road investment priorities

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ABSTRACT

The starting point is that the benefit/cost ratio is virtually uncorrelated to the likelihood of a Norwegian classified road project entering the list of investments selected for the National Transport Plan. The purpose of the article is to explain what pushes cost-benefit results into the background in the prioritization process. The reasons for their downgrading point to mechanisms that are at work not only in Norway. Explanatory factors are searched for in incentives for cost-ineffective action among planners, bureaucrats and national politicians, respectively, as well as in features of the planning process and the political system. New data are used to show that the road experts' list of prioritized projects changes little after submission to the national politicians, suggesting that the Norwegian Public Roads Administration puts little emphasis on its own cost-benefit calculations. Besides, it is shown that the petroleum revenues of the state do not provide a strong reason for neglecting cost-benefit accounts. The overall contribution of the article is to offer a comprehensive explanation why professional and political authorities in Norway set road-building priorities diverging massively from those suggested by cost-benefit analysis.

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Cost-benefit analysis; road planning; planning process

Introduction on cost-benefit analysis in Norwegian national transport planning

Even if costs and benefits to society are calculated for nearly every candidate road project to the National Transport Plan (NTP) in Norway, benefit/cost ratios do not influence on actual decision-making judging from the four plans that have been published since year 2000. The purpose of the present study is to explain why this is so. The overarching research question is why cost-benefit results in monetary units are disregarded throughout the decision-making process to such an extent that no traces of their application have been discovered by researchers. Knowledge of factors hampering the uptake of cost-benefit analysis (CBA) results in democratic decision-making is useful to actors with an opinion on the role of CBA in planning, whether they aim to strengthen its political impact or keep it weak.

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Earlier results

It is well documented that monetized net benefit to society plays a very modest role in setting priorities among investments on classified roads in Norway (Eliasson, Börjesson, Odeck, & Welde, 2015; Odeck, 1996, 2010; Sager & Sørensen, 2011; Welde, Eliasson, Odeck, & Börjesson, 2013). However, Odeck (2010, p. 493) finds that time saving and accident reduction measured in non-monetary units influenced parliamentarians' prioritization. Lack of trust in the value coefficients fits with the results of Eliasson et al. (2015, p. 386), that the same benefit items in monetized form do not affect prioritization. CBA is about the monetized impacts to society, and governing bodies have repeatedly declared them to be important (Samferdselsdepartementet, 2014, p. 12; Transport- og kommunikasjonsskomitéen, 2013, p. 54). The Storting (Norwegian parliament) has instructed the Norwegian Public Roads Administration (NPRA) to prepare CBAs in accordance with guidelines from the Ministry of Finance.

Correlation close to one between the size of the benefit/cost ratio of projects and their likelihood of entering the list of prioritized investments in the NTP would be an indication of technocratic and bureaucratic power strong enough to make parliamentary politics virtually superfluous. Lack of correlation between final political priorities and monetized net benefits to society might signal that political judgement supersedes professional considerations. Correlation close to zero does not just mean that criteria based on consequences measured in money metrics take a secondary position compared to other professional criteria neglected by the CBA. If that were the case, there would still be a measurable correlation between CBA results for a project and its likelihood of being prioritized. No correlation really means that the decision-makers do not consider the monetized consequences in a manner that is relevant for priority setting.

Limited uptake of CBA results in the prioritization process for road projects has been observed in many places. Eliasson et al. (2015, p. 378) survey contributions on the varying degree of CBA-influence in several countries of Western Europe and the Americas. Some additional recent papers are mentioned here. Bröcker, Korzhenevych, and Schürmann (2010) and Proost et al. (2014) find only modest impact of social cost-effectiveness in project selection for the EU Trans-European Network (TEN-T), which comprises both road and rail projects. Bröcker et al. use a general equilibrium model for the evaluation. Cadot, Röller, and Stephan (2006) analyse road projects in France, Hahn and Tetlock (2008) study regulatory decisions in the U.S., and Rogers et al. (2015) investigate environmental decision-making in Australia. They all conclude that other considerations overshadow the CBA results. Moreover, Bertomeu-Sánchez and Estache (2016) use data envelopment analysis to show that politics has dominated economic goals in transport infrastructure policy in Spain.

Any critical analysis of the CBA method points to unfavourable characteristics that can be used to argue that little weight should be put on CBA in political decision-making. The critical literature on CBA in ethics, philosophy, and social science is considerable. A delimitation is called for to keep within the article format. The present exposition of why CBA results do not count for more refers only to process and system features hindering cost-effectiveness, to behavioural incentives of political decision-makers and bureaucrats, and to stated reasons for these actors' scepticism to CBA. Traits of the planning process and the political system are examined by Hammes (2013) and Hammes and Nilsson (2015) for Sweden, Kemmerling and Stephan (2015) for France, Germany, Italy and Spain, Mackie,

Worsley, and Eliasson (2014) for seven countries, Martinsen, Odeck, and Kjerkreit (2010) for Norway, and Nyborg (2014) in general.

Several studies of planners' and politicians' attitudes to CBA have been undertaken. Four Norwegian interview studies of parliamentarians in the standing Committee for Transport and Communications are summed up by Nyborg (1998) and Sager and Sørensen (2011). Other empirical studies indicating what bureaucrats or politicians find to be difficult or discreditable about CBA, were conducted by Beukers, Bertolini, and te Brömmelstroet (2012) and Mouter, Annema, and van Wee (2013a, 2013b) for the Netherlands, Martinsen et al. (2010) for Norway, and Rogers et al. (2015) for Australia.

Of the above studies, only Mackie et al. (2014) share the aim of the present work of giving a comprehensive set of reasons why it is common that CBA fails to find an influential role in planning processes.

Research questions

The parliamentarians have the information required to take social net benefits into account, should they want to. The request for CBA comes from the politicians, so their modest use of the results calls for an explanation. The title of the article asks why CBA results count for very little when setting road project priorities in Norway. The answer to this main question is sought by posing, discussing and answering six more specific research questions (RQ):

- RQ 1:** Is the Norwegian state's formidable revenues from the petroleum sector the main reason for the low effect of CBA results on prioritization in the classified road sector?
- RQ 2:** Is prioritization conflicting with CBA results primarily due to the Ministry of Transport and Communication's (MoT) political departure from road experts' proposals?
- RQ 3:** What mechanisms make local politics affect the priority setting for classified road projects suggested by CBA?
- RQ 4:** Does CBA meet the needs of elected politicians at the national level?
- RQ 5:** Do features of the planning process for road projects tend to push CBA results into the background?
- RQ 6:** Do features of the political system tend to push CBA results into the background?

RQs 2, 3 and 4 reflect the possibility that important actors in the NTP process – the MoT, local politicians and the Storting, respectively – might behave in such a way that CBA results become less influential. RQs 5 and 6 acknowledge that structural characteristics of road planning processes and political decision-making processes, respectively, may cause downgrading of CBA results. The background for each of the RQs is briefly outlined below.

Re RQ 1: Many studies support the 'paradox of plenty', stating that 'most mineral exporters, and in particular the oil exporters, have done far less well than resource-poor countries over the past few decades, particularly when considering the massive revenue gains to the oil exporting countries since 1973' (Eifert, Gelb, & Tallroth, 2002, p. 1). Even if Norway has handled the efficiency-threatening effects of the oil riches reasonably well, the low regard for CBA results in the road sector might be a symptom of the inefficiency sickness found in several other resource-rich economies (Humphreys, Sachs, & Stiglitz, 2007).

Re RQ 2: Anticipated reaction may come into play when the Ministry signals the political preferences of the Government to the Directorate of Public Roads, as discussed by Agenda

(2006) and Egeberg (1995). It is possible, however, that signals from the higher political authority are drowned out by other signals, and it is uncertain in which direction top-down signals push the road experts.

Re RQ 3: Local influence on projects serving national transport needs has been much debated in Norway lately (Samset, Holst Volden, Welde, & Bull-Berg, 2014; Strand, Olsen, Leiren, & Halse, 2015). Municipal power is safeguarded by the Planning and Building Act. However, the MoT aims to make more use of state planning in order to adjust the balance of local influence and national needs (Samferdselsdepartementet, 2013, p. 91).

Re RQ 4: It was documented in the 1990s that many representatives in the Storting were sceptical of CBA (Nyborg, 1998). This critical attitude was confirmed in later studies (Sager & Sørensen, 2011). For each revision of the NTP, the standing Committee on Transport and Communications has asked for changes in the project assessment method (Sager, 2015, p. 80).

Re RQ 5: Problems of congestion and low capacity were conventionally solved by road building, but protection of climate and environment demands assessment of policies or types of projects less often subjected to CBA. Wider analysis of consequences may be called for. This is also required by the Planning and Building Act, which, in addition to environmental impact assessment, demands citizen participation in the planning process. These are planning tools with broad scope that invite a balance between CBA results and other social and environmental impacts.

Re RQ 6: Several components of the political system can potentially affect Norwegian road investments. Toll financing (Johansen, 2015; Norheim, Nilsen, & Frizen, 2013) and regional policy (Helland & Sørensen, 2009) can have a bearing on the prioritization, and so can international agreements. For example, EU Directive 2004/54 on safety in tunnels has led to stricter requirements in the Norwegian regulations for tunnel safety in the classified road network, applying to a total tunnel length of 525 km.

National transport planning and the task of CBA

The NTP is a rolling plan that is revised every fourth year. The prioritization process for roads starts with the local project proposals put forward by municipalities and counties, continues via project assessment in the regional and central offices of the NPRA, and moves on via the political adjustments of the Ministry (MoT), to the final political comments and subsequent decisions made by the Storting. The list of prioritized investments on the national road network is set up by the Directorate of Public Roads every fourth year. It is an important part of the national transport administrations' common proposal for the NTP.

Concrete and project-oriented preferences are expressed early in the planning process by local actors at the level of municipalities and counties. The need for uniform road quality over longer distances and the wish for road capacity matching traffic volumes and corresponding to road guidelines and standards, are much used reference points for project proposals. The counties in a region can find it opportune to launch common demands and propositions, sometimes based on a regional transport plan.

The decentralized part of NPRA consists of five regional offices divided into twenty local sections, usually one in each county. The strategy staffs of the regional offices convey wishes from local political actors and put forward project ideas of their own. The Directorate of Public Roads receives proposals from the regional offices about which road investments

to include in the NTP. The CBAs conducted by the regional offices of NPRA or their hired consultancies are checked and controlled for inconsistencies as part of the assessment process. The Directorate makes a list of prioritized road projects based on the local input and seldom launches own ideas for new projects. See Odeck (2010, pp. 476, 477) for a more comprehensive account.

The list of recommended projects on classified roads is submitted to the Ministry. The MoT adjusts the proposals according to all the political considerations that have to be made by the Government. The Government's NTP is sent as a report (white paper) to the Storting. The white paper is handled politically by the Storting's standing Committee on Transport and Communications. All the largest political parties are represented in the Committee and comment on the plan. Comments and recommendations are put forward in a report to the Storting. The full Storting debates the report on the NTP and votes over the proposed comments to the plan. It is not voted over the NTP itself, though, as the plan is the Government's and not the Storting's.

The purpose of the CBA is not to tell the decision-making authority what to do. The analysis does not provide a complete foundation for making political decisions, and it should not aim to do so. The aim should be the more modest one of informing the politicians of which planning alternatives score highest, seen from the efficiency viewpoint overlooking all monetized variables.

CBA can – just as other analytical evaluation methods – be given a comprehensive and technically complicated design making it hard for politicians and the general public to grasp how results are generated. However, without publicly known criteria, the choice processes taking place in the heads of decision-makers will be just as inaccessible as the algorithms of a formal model. Black-box problems can be caused both by extended use of mathematical modelling and by diffuse subjective decisions. In both cases it can be difficult for interested groups and individuals to get involved in meaningful ways, which weakens the legitimacy of the political decisions. It cannot be ruled out that feelings of inadequacy and annoyance on the part of political decision-makers in the encounter with formal assessment methods foster suspicious attitudes and low impact of CBA on the prioritization of roads.

The article is structured in line with the list of research questions above. Each of the following six sections discusses one RQ in the same sequence as they are listed.

Does the abundant petroleum income cause indifference to CBA results?

The extraction of oil and gas from the North Sea has given the Norwegian state huge revenues and permitted the build-up of the Government Pension Fund Global, reaching 7300 billion NOK by the end of 2015. One might suspect that the good financial situation is what makes Government and Storting downplay the criterion of maximizing the benefit/cost ratio when selecting road investment projects. The idea is that the country is so materially well off anyway, that it does not matter much if politicians ignore gains in monetized consequences. A more specific hypothesis is that Norwegian politicians at the national level do not have to set aside the many projects with negative expected net benefit to society, as enough money can be allocated over the national budget to implement both the profitable and the unprofitable proposals. Generous budgets diminish the need to set priorities and can weaken the incentives to top-rank the most cost-effective projects. It is necessary to

scrutinize this idea in order to motivate for the subsequent discussion of alternative explanations of the modest weight given to CBA results.

In this context, it is essential to know that the Storting has restricted the transfer of petroleum income from the Fund to the national budget. All political parties except the Progress Party (far to the right of centre) voted for the Budgetary Rule of 2001, according to which a maximum of 4% of the Fund's value can be allocated to the national budget yearly. This corresponds to the Fund's effective rate of return, which averaged 3.8% annually from 1998 to 2014. Even if the limit prescribed by the Rule has been somewhat overstepped in several years, the current liberal/conservative Government – with a Minister of Finance from the Progress Party – transferred only 2.3% in 2014 and budgeted with 2.9% for 2015 and 2.8% for 2016. Approximately one in nine NOK spent by national and local government in 2015 is transferred from the Fund (Ministry of Finance, 2014, p. 9). The arguments below give reasons to doubt that the prosperity of the state is the crucial variable explaining the Norwegian reluctance to invest in roads according to CBA results.

First, as far back as the second half of the 1980s, when income from the Norwegian petroleum sector was modest, investment priorities were not set in accordance with the benefit/cost ratio. Odeck (1991) analyzed the selection of road projects for the Norwegian Road and Road Traffic Plan 1990–1993. The 1100 projects in his study were assessed politically in the late 1980s and were located in six counties from the eastern, western and northern parts of the country. It is known that the distribution among counties of state funds for classified road investments was influenced much more by regional policy and fairness than by CBA results (Elvik, 1995). But the internal priority setting of each county was expected to be relatively disconnected from distributional politics and thus thought to give more room for priority setting in line with CBA. Nevertheless, for candidate road projects in each county, the conclusion was that the probability of being selected for the plan did not increase with higher value of the benefit/cost ratio. Net monetized benefits to society thus turned out to be held in low political regard even when Norway had barely begun to harvest the riches of the North Sea reservoirs. By 1988, the state's net cash flow from the petroleum sector had exceeded 50 billion 2011-NOK annually for only seven years (Norwegian Government, 2012). Gross domestic product per capita was only half in 1988 compared to 2014, measured in fixed prices.

Second, use of petroleum revenue has not raised the standard of Norwegian roads to a quality level from which further improvement will add little economic welfare. The density of the network and the percentage of roads with motorway quality are among the lowest in Europe (International Road Federation [IRF], 2014). The Norwegian network of classified roads has undergone a long period of deterioration. Sund (2012, p. 29) shows that it will cost around 25–40 billion NOK to eliminate the maintenance backlog. Furthermore, NPRAs cost estimate is 1000 billion NOK for bringing the entire classified road network up to the quality prescribed by the highway standards and specifications, in addition to implementing the most significant shortenings of classified routes and the building of important bridges to substitute ferries (Statens vegvesen, 2015, p. 7). The upgrading would take more than thirty years with the current rate of investment. The marginal net benefit of proposed road projects is not low in general. The number of candidate projects on the Norwegian classified road network that is profitable according to CBA, is high enough to fill the entire NTP-budget for roads (Sekretariatet for Nasjonal transportplan, 2012b).

Third, even an unlikely verification of the hypothesis that Norwegians feel sufficiently well off to be more or less indifferent to further economic gains, would not give reason for political disinterest in CBA results. Investment policy in line with the criterion of maximum benefit/cost ratio is not about increasing per capita income in any case. Rather, it is to a high extent about appropriating travel time savings and traffic safety gains. For most road projects, these are the main components on the benefit side of the CBA account (Holz-Rau & Scheiner, 2011; Welde, 2009). Only part of each of these two components is directly related to increased monetary income. A large portion of the travel time savings will not be transferred to working time. Concerning car travelling in Norway, 59% of the trips take place during leisure time, and the occupancy is higher than for work-related trips (Vegdirektoratet, 2014, p. 82). Moreover, some 80% of the value of a statistical life in Norway does not reflect loss of income, as it is a willingness-to-pay measure including loss of welfare and quality of life (Veisten, Flügel, & Elvik, 2010, p. 1). There is no evidence that safer travelling and faster journeys outside working hours are less appreciated in high-income countries. On the contrary, the income elasticity of the value of travel time is positive (Börjesson, Fosgerau, & Algiers, 2012), which is also the case for the income elasticity of the value of a statistical life (OECD 2012, p. 69).

Fourth, Norway is not alone in giving low weight to cost-effectiveness when setting priorities in the road sector. Similar observations were made for other countries in periods when they were no better off economically than Norway was at the time. The U.K. has a much smaller petroleum sector than Norway relative to GDP, and the GDP per capita was only $\frac{3}{4}$ of Norway's in 1999. Nellthorp and Mackie (2000) still found that benefit/cost ratios in Britain did not seem to impact decisions on road investments. Nilsson (1991) reported very low correlation between CBA results and road investment decisions in Sweden. GDP per capita was nearly equal in Norway and Sweden in 1991. More recently, Eliasson and Lundberg (2012) found that the politicians in Sweden, without a significant petroleum sector, put little weight on CBA results when ranking road projects. The research undertaken in Sweden and the U.K. does not rule out the possibility that oil-based prosperity makes Norwegian politicians indifferent to CBA, but it indicates that alternative explanations exist.

The reason why the Government and the great majority of the Storting do not want extra money for national road investment (and numerous other good purposes) to be readily available from the Government Pension Fund, is the need to protect competitive industries from the higher wages and product prices that would result from increased overall domestic demand. Instead of heating the Norwegian economy by spending more oil revenue, the state weakens private purchasing power by making motorists pay around half of the investments on classified roads in user charges (Norheim et al., 2013, p. 16). If it were unproblematic to collect the money from other sources, it would be politically futile to annoy potential voters by withdrawing 10.5 billion NOK in road tolls from them in 2014 to improve the classified roads (Johansen, 2015, p. 179).

This section indicates that the high income from the petroleum sector is not the main reason for national politicians' deviation from maximum benefit/cost ratio as the criterion for selecting road projects. It is even less likely that bureaucrats and planners in the NPRA should let the alleged cash availability interfere with their professional principles for setting priorities. Yet this would be strongly suggested by the hypothesis that oil revenue makes Norwegian politicians indifferent to CBA results, as it is established in the next section that the list of road projects politically selected for the NTP deviates little from the collection of

projects proposed by the road experts. A search for other political and procedural explanations is thus required to understand the virtual indifference to cost-benefit results in the Norwegian road sector.

Marginalization of CBA takes place in the pre-Ministry stages of NTP

This section addresses the question whether prioritization conflicting with CBA results is caused mainly by the Ministry's departure from the proposals of the road experts. In this context it is essential to know at which stage of the planning process deviations are observed.

It can be seen directly from project information in the white paper on NTP that cost-benefit results are often outstripped by other decision criteria. Tables for cost and net benefit of each classified road project are shown in NTP 2014–2023 (Samferdselsdepartementet, 2013, Chapter 15). The tables show only the 25 big projects with costs above $\frac{3}{4}$ billion NOK (2013-value) that start in the period 2014–2017. Ten of those projects have an estimated net benefit above zero. Here, numbers are aggregated to corridor-level, and the resulting net benefit/cost ratios are presented in Table 1.

Table 1 shows considerable deviation from social profitability for the new road investments in several transport corridors. It is important to the overall argument of the paper that this downgrading of the CBA results does not start with the Ministry's political work on the NTP, but is well under way much earlier in the process, already when the regional offices of the NPRA adopt many of the project suggestions from local politicians.

It is, by and large, the same set of road projects that is proposed by the Directorate, considered politically by the Ministry, sent to the Storting by the Government, and funded by the parliamentary majority. The consistency between the prioritizations of the road bureaucracy and the Government can be documented for the planning period 2014–2023. Research for the present paper compares the maps showing the location of the projects on classified roads in the national transport administrations' proposal and the 155 projects in the Government's plan (Samferdselsdepartementet, 2013, pp. 248, 249; Sekretariatet for Nasjonal transportplan, 2012a, pp. 182, 183).

In order to underpin the statement that the national Government tends to make only small changes in the investment proposals from the Directorate of Public Roads, the following demands should be satisfied:

Table 1. Benefit-cost summary for the big road projects with upstart 2014–2017 in the main transport corridors of Norway (mill 2013-NOK).

Corridor	Number of projects	Net benefit	Cost	NB/C ratio
1. Oslo-Svinesund-Kornsjø	1	-860	1830	-0.47
2. Oslo-Ørje/Magnor	2	-1790	4750	-0.38
3. Oslo-Grenland-Kristiansand-Stavanger	7	12080	33890	0.36
4. Stavanger-Bergen-Ålesund-Trondheim	4	18020	26800	0.67
5. Oslo-Bergen/Haugesund. Branch via Sogn to Florø	4	-2320	8950	-0.26
6. Oslo-Trondheim. Branches to Måløy, Ålesund, and Kristiansund	3	5210	6500	0.80
7. Trondheim-Bodø. Branches to the Swedish border	2	-1740	5670	-0.31
8. Bodø-Narvik-Tromsø-Kirkenes. Branches to Lofoten and the national border	2	-530	1890	-0.28

- The maps in the proposal and the final NTP show almost the same set of projects; that is, the Ministry discards only a small number of the projects recommended by the Directorate, and it includes few new ones.
- Nearly all projects that are included in the Directorate's proposal only under a wide economic framework (main budget alternative plus 45%), must be selected by the Government for start-up in the second part of the planning period (that is, 2018–2023).
- Nearly all projects recommended by the Directorate even within a narrow economic framework (the main budget alternative), must either be under construction already or be planned by the Government for start-up in the first part of the planning period (that is, 2014–2017).

Comparison of the maps marking the location of the Directorate's and the Government's selected road projects respectively, shows that the number of projects that enter or leave the list of prioritized road projects is less than 4% of the total. The share of ordinary projects proposed by the Directorate even under a narrow budget framework, but still placed late in the planning period by the Government, is also around 4%. Six projects that were prioritized by the Directorate only in the case of a generous budget, are nevertheless planned by the Government to be started in the period 2014–2017. Thus, this goes for less than 4% of the total set.

These quantifications show that the set of prioritized projects on the classified road network undergoes only small changes on its way from the Directorate to the Storting via the MoT. It is by no means self-evident that the technical-economic experts and the politicians should make very similar judgements as to which road projects deserve priority. A point of discussion is therefore whether the recommendations of the Directorate of Public Roads are sufficiently independent and given on a basis of professional knowledge and research (Agenda, 2006; DIFI, 2008).

Signals from the Ministry help the Directorate foresee the response to recommended road investments. The Directorate may find it less than useful to propose projects that are likely to be dismissed by the superior authority. Such anticipated reaction has been analysed several times in Norwegian civil service and is a useful aspect of the Directorate's perception of its role (Christensen, 1991; Egeberg, 1995). The Directorate may fear doing futile work – and perhaps consume political goodwill – if neglecting signals from the Ministry when working on the list of recommended projects.

It is quite possible that NPRA receives political signals from MoT, which lead the Directorate to propose road projects with low and negative benefit/cost ratios. Reliable information on the amount and strength of such signals is not available. However, strong signals that are observable to the general public point in the opposite direction. Over several periods, a tendency in the NTP guidelines from the MoT has been to more sharply underline the need for a strategy with stronger emphasis on monetized benefits to society. This tendency also involves demands for clear explanations by the national transport agencies why massive divergences from maximum benefit/cost ratios are the rule rather than the exception, as in the guidelines for the NTP period 2014–2023: 'It is important that the proposed plan makes the priority setting transparent, and makes visible the criteria that really counts in the decision-making' (Samferdselsdepartementet, 2011, p. 17). Recently, the Ministry instructed the four national transport administrations to 'develop a system

for presenting more systematically the variables, other than estimated economic effects to society, that are underscored in priority setting' (Samferdselsdepartementet, 2014, p. 12).

Return now to the input to the project prioritization of the Directorate of Public Roads. Available data do not allow quantification of the alterations made by the Directorate to the regional lists, as these lists are not made public. Based on interviews with project managers and the regional NTP coordinators, Strand et al. (2015, p. 10) nevertheless infer that 'the central level [the Directorate] makes only small changes in the regional proposals'. The conclusion is that the portfolio of prioritized road projects is not changed much throughout the planning and decision-making process starting with the political-technical proposals generated locally, and ending with the set of projects receiving state funding. Divergence from the cost-effectiveness criterion takes place early in the planning process, before the list of proposed projects reaches the Ministry.

The local level is powerful even if the NTP portfolio is made up of projects on classified roads including European highways; that is, roads satisfying national needs. Some consequences of the national politicians' and the national competent authority's willingness to comply with local interests and demands are discussed in the next section.

Local political input as reason for bureaucrats' low emphasis on CBA results

Public agencies with political superiors have to listen for signals from above. This applies to the Directorate of Public Roads when it considers projects on classified roads for the NTP. It is less obvious that political signals from *below* should be influential, even if this seems to be the case in the prioritization process of Norwegian road projects. The considerations behind the road investment proposals of local politicians have not been systematically studied. Politicians taking an interest in transport may know the county's classified road network reasonably well. Sandberg Hanssen and Jørgensen (2015, p. 54) suggest that '(t)he physical characteristics of the roads and their levels of traffic provide the politicians a better intuitive understanding of the effects of allocating money to the roads than the effects in monetary units presented in the cost-benefit analyses'. It can be hypothesized that political signals from below spring more from local politicians' personal experience with the roads where improvements are demanded, than from anticipated benefit/cost ratios of improvements.

Classified road projects that are singled out for implementation in the first four-year period of a revised NTP, have usually been politically deliberated as part of a municipal sector plan. A wide range of actors with conflicting points of view on which road alignment is the best, are involved in the planning processes at this stage. Once the exact position in the terrain is chosen, a detailed development plan is made, which must be sanctioned by the municipal council (city council). Road plans are worked out, treated politically, and decided on in line with the Planning and Building Act. This means that responsibility for the plans lies primarily with the municipal council, implying that local government has decision power even over infrastructure meant to satisfy national needs.

Projects on classified roads are funded wholly or partly over the national budget, placing few if any obligations on local authorities and interest groups, except toll-paying motorists. The municipalities have weak motives to let net benefits to society at large influence which national projects they go for. They are not responsible for the project and do not pay for it. The municipality will, however, have a strong motive for maximizing local benefits. In some cases, this can be achieved by constructing bridges to substitute for car ferries; in other

cases it requires costly road design, such as tunnels to avoid noise. Projects that are – with a sober design – defensible in terms of net benefit to society, may be inflated and oversized, as exemplified by Samset et al. (2014), because the extra quality comes at zero price to local advocates. The costs are carried by the state or by drivers through road tolls. To the extent that municipalities and local branches of political parties influence the selection of projects on classified roads, significant differences between CBA results and political priorities are to be expected (ibid).

In general terms, the reasons why local initiatives and decision rights may tend to pull the selection of classified road projects away from CBA criteria are the following (Ostrom, Gibson, Shivakumar, & Andersson, 2001; Samset et al., 2014):

- Political institutions have created a kind of gift relationship in the road sector, with the state as donor and municipalities as recipients.
- To the extent that the state cannot scrutinize all assumptions and calculations of traffic, costs and benefits, an information asymmetry arises and favours the local receivers.
- In cases of local/national conflict of interest, some key politicians and other stakeholders at the donor side either have their own agendas (such as campaigning), or their loyalty is with the recipient rather than the donor (society).

Elected members of both local and national political assemblies expect that the assessment of road projects considers effects for the district traversed by the relevant road section. Equally important, there is a stated consensus on the need for reducing the cost of transport to and from peripheral regions, thus encouraging regional balance in the prioritization of projects (Samferdselskomitéen, 2004, p. 9; Transport- og kommunikasjonskomitéen, 2013, p. 90). Such regional policy has been observed over a number of years (Elvik, 1995). The decision-makers appear ‘concerned not to allocate an excessive amount of investment funds to one and the same geographical area’ (Fridstrøm & Elvik, 1997, p. 155). In accordance with this, a particular road project is very likely to be implemented sooner or later, even with a low benefit/cost ratio, provided its local backing persists over a few four-year planning periods. The political will to regional fairness, and thus geographical dispersion of investments, leads to a selection process where the ‘seniority’ of the project idea takes precedence and trumps the consideration of net monetized benefit to society at large. This claim is supported by eight interviews with experienced road bureaucrats close to the NTP process (Lid, 2014, pp. 59–61). The ‘seniority’ principle seems to play an important role in the choice of projects that the regional offices of the NPRA propose to the Directorate of Public Roads.

The required compliance with municipal plans in combination with the political desire to ensure economic progress in all regions gives local authorities a strong hand in the process of selecting road projects for NTP. This effect may be reinforced by local co-funding of road improvements by collection of user fees. Toll payment is increasingly common in Norway. In 2013, 47% of the investment costs related to classified roads were covered by road tolls. From 2003 to 2013, the contribution from tolls to investments on national and county roads has increased fourfold (Samferdselsdepartementet, 2013, p. 93). The rationale of user payment is most convincing where traffic is considerable. High traffic does in itself strengthen the utility side of the cost-benefit account, when the project offers motorists more attractive trips. Taken by itself, an increased share of toll-financed projects should therefore bring the selected portfolio of investments more in line with the CBA results. On

the other hand, experience from the five biggest urban areas in Norway shows that local funding comes with strong influence on the local package of transport projects (Norheim et al., 2013; see Mellin, Nilsson, & Pyddoke, 2012, pp. 27–29 for some Swedish results). This may lead to more expensive solutions as argued above.

This section has shown that several mechanisms contribute to local political influence giving CBA weaker impact on the prioritization of classified road projects in NTP. Local power is enhanced by the Planning and Building Act, by regional policy, and by the large amount of local user payment.

Shortcomings of CBA as seen from the Storting

Most of the research concluding that CBA results are disregarded in the prioritization of Norwegian classified road projects, treats the Storting as the decision-maker. It seems reasonable that elected representatives are less likely to vote in accordance with the benefit/cost ratios of projects the more sceptical they are to the method of CBA. When sceptical, they are apt to look for alternative decision support, even if several studies have found CBA results to be quite robust (Börjesson, Eliasson, & Lundberg, 2014; Holz-Rau & Scheiner, 2011; Thureson & Eliasson, 2016).

Since the 1990s, the MoT and the Storting's standing Committee on Transport and Communications have repeatedly stated that CBA is to be an element in the assessment of road projects (Samferdselsdepartementet, 2011, p. 17; Samferdselskomitéen, 1993, pp. 33, 34). Under the incumbent liberal/conservative government with ambitions to present NTP 2018–2029, the Ministry even proclaims that 'economic analyses from the perspective of society should be given more weight in the evaluation of the use of resources in the transport sector' (Samferdselsdepartementet, 2014, p. 12). This is not self-evident, as many elected representatives express low confidence in the CBA (Transport- og kommunikasjonsskomitéen, 2013, pp. 14, 15, 56). Researchers have established the existence of such distrust since the middle of the 1990s (Nyborg, 1998).

Recently, parliamentary party groups have complained that:

- Values per saved travel time unit and value per saved statistical life are far too low (Transport- og kommunikasjonsskomitéen, 2013, pp. 30, 55).
- Wider economic impacts (estimating agglomeration benefits) should be added to the utility of travel time savings (Transport- og kommunikasjonsskomitéen, 2013, pp. 54–56).
- Changing plot values should be included in the evaluation of big road projects, increased punctuality is insufficiently valued, and the discount rate is too high (Transport- og kommunikasjonsskomitéen, 2013, pp. 54–56).
- The item in CBAs of public projects that consists of 20% extra costs due to market inefficiencies resulting from taxation, should be deleted (Stortinget, 2010).

The parliamentarians' recurring demands for methodological improvement of CBA can be derived from the reports of the Committee on Transport and Communications (Sager, 2015, p. 80).

The listed changes all pull in the same direction, in that they will make a number of projects on classified roads appear more beneficial to society. Elected representatives both left and right on the political spectrum see a need for upgraded calculation of social benefits;

that is, higher values and higher number of positive effects. Representatives consider the calculated benefits of many road projects to be unrealistically low, seriously limiting the choice set of new projects that give positive net benefits as well as political gains. Politically motivated project portfolios become easier to defend when more of their contents seem to be worth implementing due to increasingly comprehensive benefit calculations. Decision-makers may be tempted to judge an analytic tool from the method's ability to serve such a political purpose, rather than from the method's knowledge-producing capacity.

In addition to the stated misgivings above, there may be tacit political reasons why CBA cannot fully cover the needs of the elected representatives. Politicians in the Government or in the Storting can include purely political considerations among their project assessment criteria, even if the political judgement criteria are never mentioned in planning reports or official documents. Priorities may be set in accordance with, for example, what was promised in the latest election campaign, the wishes of powerful local party organizations, the agitation of protest movements against certain road projects, or what central county politicians insist is necessary for the local production industry. This remains a hypothetical point, as it is in the nature of the case that the extent of deviation from CBA results on this basis is unknown.

This section suggests that many elected politicians at the national level conceive of CBA as a too narrow basis for making decisions on classified roads. They may need to consider political consequences that do not belong in any formal project assessment method.

Planning process characteristics counteracting cost-effectiveness

Process affects product, and this mechanism can work through planning process characteristics that influence the formal assessment of projects. The section first deals with some consequences of a multi-goal planning process on the use of CBA, and then briefly mentions the problem-steered approach and other process features challenging cost-effectiveness.

Directorates must adapt to the fact that they are part of the political apparatus serving the minister. They therefore base recommendations on 'a somewhat broader perspective than professional skill in their respective fields; for example, by incorporating their own expert viewpoints into a more comprehensive societal perspective' (DIFI, 2008, p. 10). Some of the informants to another report (Agenda, 2006, p. 131) also mentioned this, and opined that the Directorate of Public Roads should to a greater extent consider environmental effects, land use, and wider economic impacts in the assessment of big road projects. Taking this advice would mean continuing the long-lasting trend towards expansion of the CBA, for example, by adding new entries concerning consequences to environment, climate, and health (Mackie et al., 2014, p. 7). It is likely that more comprehensive CBAs would contain an increased number of items with highly uncertain monetary estimates, and this does not necessarily improve the scientific quality of the analysis. Neither are there clear indications that higher comprehensiveness has made application of CBA results more attractive to the politicians (Sager, 2013).

The unranked political main goals of the NTP-period 2014–2023 concern traffic safety, climate and environment, universal design, and accessibility. If welfare economic gains do not have a prominent place among the main goals, and thus in the politics of the MoT, the priorities of the Directorate of Public Roads are likely to be less marked by cost-effectiveness as the overriding guiding principle (Produktivitetskommissjonen, 2015, p. 368). The contrast

between the criterion of cost-effectiveness and the four political main goals should not be exaggerated, however. Reduced transport costs in time and money mean higher accessibility, and most often they are also the major benefit items of CBA. Furthermore, traffic safety enters CBA as changes in accident costs.

Regional policy may call for disregard of the cost-effectiveness criterion. High traffic volumes usually lead to increased net benefits in the CBA as long as congestion is moderate. Road projects with high expected traffic are most often located in central parts of Norway. However, a main goal of NTP 2018–2029 is to achieve ‘better transport conditions for persons and goods in the entire country’ (Samferdselsdepartementet, 2015a, p. 11). Retaining the pattern of settlement and economic activity in peripheral regions requires a prioritization of classified road projects that deviates to some extent from recommendations based only on CBA.

The broader the professional assessment, in the sense that more decision criteria have to be balanced against each other, the more difficult it becomes to determine what is a professional and what is a political ranking of the projects. When more professional criteria are taken into account, more political trade-offs between them must necessarily be made. In a comprehensive assessment of what best serves society, planners cannot have the one without the other. This is so because the criteria have to be balanced, which means setting social values off against each other, and such trade-offs are unavoidably political.

A much used principle is to first implement the projects addressing the most serious problems (Eliasson et al., 2015, p. 392). However, recognizing an acute problem does not mean that the project under consideration is able to solve it, let alone solve it cost-effectively. While approving a wide search for alternative ways to ameliorate an unsatisfactory situation, Eliasson (2015) argues, on a general basis, that planning with a strong problem focus diverts attention from cost-effectiveness. He is sceptical about early articulation of needs to be satisfied, problems to be solved, and goals to be achieved. Such articulation often directs political attention and popular anticipation to a high but quite arbitrary level of service. It is politically risky to reject action that would solve a recognized problem, and it may be hard to build political backing for projects and measures that do not fully solve the problem. Yet it is often here, in the set of options improving the present situation without fully accomplishing what has been imagined by the public, that cost-effective strategies are found. An example is the problem of queues of cars. Cost-effective measures do not eliminate the queues, as this would require abundant and costly road capacity that would be redundant except for short periods. Eliasson contends that the results of CBA would have more influence in a planning process that is improvement-seeking rather than problem-steered.

A final point concerns communicative planning, which has occupied a central position in planning theory for three decades (Forester, 1989). Its heavy emphasis on co-operation, dialogue and citizen participation is apparent in the Norwegian Planning and Building Act providing the legal framework for road planning. The planning authority must arrange for active involvement of affected individuals and groups. Electronic presentation and dialogue should be facilitated in all phases of the planning process. The Norwegian Productivity Commission points to a little-discussed consequence of communicative planning: ‘Throughout the long-lasting and dialogue-oriented planning and fact-finding process, high expectations are built regarding the subsequent implementation of the project’ (Produktivitetskommissjonen, 2015, p. 375). The more enthusiasm and positive engagement is shown during citizen participation, the harder for politicians to drop or scale down

the project. It is especially problematic in this context that there is no directive or rule in Norwegian road planning weeding out very unrewarding projects early in the process. Successful dialogue may lock the decision-makers to a cost-ineffective line of action. The start-up of land acquisition and other preparatory work prior to formal political decision – even for projects with benefit/cost ratio less than one – reinforces this effect. It raises local hopes further, and it complicates the task of making a collective decision serving national interests.

This section has shown that existing planning processes have features that tend to give CBA results less impact on the prioritization of road projects.

Features of the political system pushing CBA into the background

Political economy arguments are put forward in a number of papers to explain lack of cost-effectiveness in government prioritization. Hammes (2013), Hammes and Nilsson (2015), and Kemmerling and Stephan (2015) provide recent examples from the transport sector, while Elvik (1995) and Helland and Sørensen (2009) are Norwegian examples. One theory focuses on the swing voter, predicting that more resources will be distributed to election districts with many voters in the ideological middle, as it is assumed that popular projects induce such voters to support the incumbent party. In this section, even funding institutions, new investment agencies, and international agreements pertaining to the road sector are seen as elements of the political system that can affect the emphasis put on CBA.

A partisan process, in which political decision-makers tend to allocate projects to the districts of their supporters, would clearly invite significant differences from CBA ranking. Eliasson et al. (2015) found a positive relation between government project allocation and voter support in Norway, but did not find such a relation in the Directorate's selection. In a preceding section of the present paper, it was shown that the road project portfolio recommended by the planners for NTP 2014–2023 did not deviate much from the set of projects selected by the Government. This suggests that a possible partisan bias in project allotment is not strong.

Counties with big cities and heavy traffic on a large part of their classified roads tend to have candidate NTP projects with higher benefit/cost ratios than low-traffic counties. Rational behaviour among politicians at the national level may however lead road investments in other directions. The Norwegian electoral system grants a higher parliamentary representation to sparsely populated rural counties. In these counties, fewer voters have to be won for the cause of a political party in order to give it an extra representative in the Storting. Incumbents may then be tempted to implement popular projects in rural low-traffic counties. Sandberg Hanssen and Jørgensen (2015) find that – other explanatory variables kept constant – the amount of money allocated to repair and improvement of a road during the NTP period 2010–2019 increases with the number of representatives per 1000 inhabitants. This is in line with Helland and Sørensen's (2009) conclusion based on Norwegian data from 1973 to 1997. Hammes and Nilsson (2015) did not find support for the swing voter model in Swedish data, however. If the Norwegian results are valid, it means that the electoral system in Norway encourages road investment in counties where benefit/cost ratios tend to be low.

Some effects of toll roads are already mentioned. The point here is that national politicians may be affected by the fact that more new road per budget-million is achieved with

user charging. By giving high priority to partly toll-financed projects, a higher number of projects will be realized, probably leading to increased voter satisfaction. The projects heavily backed by local politicians applying for toll-funding are not necessarily those providing the highest net benefits for the society at large. One mechanism to this effect is based on the Storting's demand for a high degree of local political agreement about the project and its funding, as a precondition for permitting toll collection. This demand gives the right of veto to every stakeholder who is required for local consensus. Each of them can exercise this power to shift project design away from cost-effectiveness and towards an alignment and a design serving the actor's own interest.

An intuitively appealing precept for practice recommends investment to comply with official guidelines and standards for classified roads, giving priority to the road sections lagging most behind. The need for uniform standard over longer stretches of road is often used in Norway as a reason for investing despite low benefit/cost ratio. Sandberg Hanssen and Jørgensen (2015) still find that the technical characteristics of roads do not substantially influence funding decisions. Exceptions sometimes follow from international agreements though. A recent example is the EU Directive 2004/54/EC on safety requirements for new and existing tunnels longer than 500 m in the trans-European road network. About 120 tunnels in the Norwegian part of the network are comprised by the safety directive. For many of them, gradient, ventilation, emergency exits, evacuation routes, etc. have to be improved whether or not this can be justified by CBA.

In the case of the new state-owned limited company Nye Veier AS, there might be a conflict between its goal of integrated improvement of longer stretches of road (to reap economies of scale) and the goal of increased monetized net benefits to society from the overall use of resources in the transport sector (Samferdselsdepartementet, 2015b, p. 5). Completion of long stretches makes it necessary to include sections where investment has lower priority (and maybe lower benefit/cost ratio). This is confirmed by the fact that only about 40% of the estimated investment costs pertaining to the initial portfolio of the new company are related to projects that are given priority in NTP 2014–2023. Admittedly, benefits are estimated for very few of the new projects, so it cannot be determined yet whether they have lower benefit/cost ratio than the projects drawn from NTP 2014–2023.

This section has shown that some characteristics of the political system for making investment decisions on classified roads in Norway, tend to push CBA results into the background.

Concluding remarks

The intention has not been to argue that the benefit/cost ratio should be decisive when setting priorities among projects on classified roads, but rather to highlight circumstances that tend to push CBA results into the background. The loss to Norwegian society (reduction in net willingness to pay) resulting from the current selection procedures in the classified road sector is too serious to leave the issue undebated. The Directorate of Public Roads estimates that the nation could gain around 45 billion NOK (2011-value) by choosing the projects with highest benefit/cost ratios instead of the Government's planned strategy (Sekretariatet for Nasjonal transportplan, 2012b, p. 5).

Several researchers have found that the impact of CBA on the setting of political priorities in the road sector is quite modest, and some of them have indicated select causes. This article adds to the international literature a more comprehensive overview of reasons why

CBA may be given little weight when lists of prioritized road investment projects are set up in national transport planning.

The article outlines procedural characteristics and political mechanisms that have the effect of downgrading the results of CBA. The essence of the points dealt with is general and does not pertain only to Norwegian conditions:

- High gross national product per capita is not necessarily a reason for low impact of CBA on public road investment decisions.
- Agencies expected to give professional advice may be too keenly listening to political signals.
- Perverse incentives: Local influence on decisions of national significance may not be related to responsibility or cost coverage.
- It is never openly stated that unprofitable projects are given priority because of local pressure, election promises, horse-trading between governing parties, or need to satisfy the grass roots of the party organizations. Political considerations of this kind are much too vulnerable to attack by political rivals and critical voices in the general public. Hence, they are not found in planning documents or as comments to CBA accounts.
- Demand for equal allocation of projects to administrative districts (counties) trumps implementation of the most cost-effective investments.
- The principle of choosing projects with high benefit/cost ratio may be supplemented by so many other assessment criteria that the difference between professional and political judgement is dissolved.
- Various forms of fairness-seeking, vote-catching and logrolling in democratic multi-party systems can sometimes take precedence over social profitability in public priority setting.

The analysis strengthens the evidence that prioritization in the Norwegian road sector deviates from the CBA results even before the bureaucrats hand over the list of recommended projects to the Ministry. It also presents arguments suggesting that one should look beyond the oil-lubricated government finances for the main drivers tending to sidetrack the CBA results. Mechanisms taking decision-makers' thoughts off the benefit/cost ratio are found in road experts' compliance with local political signals, in a planning process directing attention to several other considerations than cost-effectiveness, in the political decision-making process, and in many parliamentarians' scepticism to CBA as a method.

Some parliamentarians complain that incomplete cost-benefit accounts are used for assessing road projects. They have not yet perceived as problematic that complete CBAs, including every consequence that people care about, may outstrip their own political deliberation on the projects and make democratic treatment of NTP investments less important. Decisions about large-scale interventions and use of resources in the road sector should be made on a foundation of combined economic and political reasoning. CBA does not give the full answer – even when supplemented with the non-monetized consequences of the broader impact assessment currently in use.

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