



# The allocation of transport infrastructure in Swedish municipalities: Welfare maximization, political economy or both?



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## ABSTRACT

This paper compares models for explaining the volume of transport investments in Swedish municipalities: 1. by the planned projects' welfare consequences, 2. in terms of the district demand (the common pool) model, namely a municipality's share of the cost towards the investment and 3. electoral concerns and/or lobbying, as described by a swing voter model. We find that the welfare only hypothesis has little explanatory power. The district demand model explains the investment volume in rail projects, while the swing voter model explains road investment better. Lobbying does not seem to have any impact on the investment volume. Finally, we find that including a measure of the welfare in the political economy models greatly enhances the models' explanatory power. Our main conclusion is that future analyses of what drives the allocation of resources for transport infrastructure should consider aspects related to both political economy, welfare, and the transport mode.

## 1. Introduction

Economic-policy decisions can be seen either as resulting from the maximization of social welfare or as the maximization by incumbent politicians of objective functions that not necessarily correlate with social welfare. Except for resource constraints, the politico-institutional structure and the wish to be reelected are suggested as candidates for understanding the priorities in actual decision-making. Using information about investment in transport infrastructure in France, Cadot et al. (2006) is one example of this literature. Other political economy studies of transport infrastructure investments include Fridström and Elvik (1997), Helland and Sørensen (2009), both of whom study the allocation of road project funding in Norway, Knight (2004), who examines the allocation of transport projects in the US, and Jussila Hammes (2013), (2015), who studies project choice in Sweden.

Decision-makers' prioritization of infrastructure projects has also been studied from a welfare perspective. The point of departure in Nilsson (1991) was the government's formal instruction to the agency in charge of compiling an investment program for national road infrastructure to account for social welfare.<sup>1</sup> In his study, no relationship between social welfare and actual priorities could be established

and no other rationale for priorities was found. Policies in Sweden have subsequently been adjusted, primarily by shifting the ultimate control over project prioritization from the sector agency to the government itself. Subsequent research still indicates that the results of a CBA in Sweden at best provide a partial explanation of project prioritization; cf. Eliasson and Lundberg (2012) and Jussila Hammes (2013). Similar observations have been made in Norway (Odeck, 1996; Fridström and Elvik, 1997; Welde et al., 2013), Estonia (Kõrbe Kaare and Koppel, 2012), Mexico (Ramírez Soberanis, 2010), France (Quinet, 2010) and in the United Kingdom (Mackie, 2010).

In order to explain the prioritization of infrastructure projects, this paper combines these two literatures: the political economy modelling and the assessment of the impact of welfare considerations on project choice. We start by shortly covering two possible political economy models, the district demand model (also known as the common pool model, or the "1/N" model) and the swing voter model with lobbying, that may shed light on what, specifically, is driving policy decisions as manifested in two national transport infrastructure investment programs in Sweden. Previous studies using the Swedish data have not directly tested the welfare hypothesis against the political economy hypotheses. Thus, Eliasson and Lundberg (2012) only examine the

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<sup>1</sup> The means for meeting this target was to rank projects based on the results of a Cost Benefit Analysis (CBA), summarized in terms of Net Present Value ( $NPV=B-C$ ),  $B$  and  $C$  representing the present value of benefits and costs over the expected lifetime of a project. Because of budget constraints, projects with a higher  $NPV$  ratio ( $=NPV/C$ ) were to be prioritized over less beneficial projects.

impact of welfare considerations on planners' and politicians' decision-making, and how the CBA methodology could be further enhanced in order to provide better support for decision-making on welfare maximizing grounds. Jussila Hammes (2012), (2013) is an ad hoc examination of the choice of projects to include in the National Transport Infrastructure Plan for 2010–2021. She finds that the probability of a project being included in the Plan was greater in electoral districts that had voted for the incumbent government and that co-financing influenced the probability of inclusion in the Plan positively. That paper lacks a theoretical model to explain how these impacts arise. Jussila Hammes (2015), like us, studies the allocation of investment funds to Swedish municipalities, using data from the National Transport Infrastructure Plans for 2004–2015, 2010–2021 and 2014–2025. The focus of that study is in examining whether the politicians' apparent belief in the unemployment-reducing qualities of transport infrastructure investments can explain the allocation of project funds to municipalities, at the same time controlling for some political economic variables. A further distinguishing feature of our paper is that we, in contrast to much of the existing literature, provide a theoretical background to our empirical examination, and also that the welfare hypothesis is tested against the political economy hypotheses.

Helland and Sørensen (2009) make a comprehensive survey of the results of previous tests of both the district demand and the swing voter model. For the present paper, it is therefore necessary only to highlight the results of a few previous transport- or Sweden-related analyses. Knight (2004) finds empirical support for his hypothesis about common pool incentives (the district demand model) from an analysis of 1998 US Congressional votes over transportation project funding. Thus, the probability of a political representative to support funding for projects is increasing in a legislator's own-district spending and decreasing in the tax burden associated with aggregate spending.

Helland and Sørensen (2009) find no support for the district demand model in their analysis of road investments in Norway between 1973 and 1997 while the swing voter model rationalizes observed priorities. They furthermore find that high levels of party identification – a measure of voter's resistance against being 'bribed' by central allocations of funds – reduce investments. The panel of France's regions over 1985–1992 used by Cadot et al. (2006) to examine the determinants of transport infrastructure investments also indicates that electoral concerns and influence activities (lobbying) were significant in explaining the cross-regional allocation of investments. Johansson (2003) tests the swing voter model using another type of good where incentives are similar to infrastructure investment, namely intergovernmental grants in Sweden between 1981 and 1995. She also finds support for the swing voter model.

The paper is organized as follows: The next section shortly summarizes some relevant literature, provides background, and states the hypotheses tested. In Section 3 we describe the data, the regression results are discussed in Section 4, to be followed by a discussion in the concluding Section 5. The formal model is presented in Appendix A.

## 2. Background and hypotheses

Political economy offers several explanations to the preferences that guide the provision of public services. In the present paper, we examine two of these. The district demand model starts by noting that spending on public goods, here transport infrastructure, provides benefits that primarily are geographically concentrated while costs are paid by taxpayers at large. This separation between project benefits and costs may create an incentive for a district's representatives in the parliament to demand increased spending. Since each district pays only a small share of the associated costs, but enjoys most of the benefits (the common pool problem), new infrastructure may be seen as a prize won by the political majority for their constituency. In addition, in order to avoid overspending, parties have reason to restrain spending in other districts (Knight, 2004).

The district demand model, including spill-overs to neighboring districts, is described formally in Appendix A.1. The model leads to following hypothesis:

**Hypothesis 1.** National funding of transport infrastructure in a municipality decreases as the tax share of the district increases.

The logic of Hypothesis 1 is that when the share of the cost of an investment that the district itself bears increases, the inclination of the district's representative(s) to work towards realizing an excessive level of investment decreases. The district demand model is an oft used explanation to the observation that elected politicians bias the allocation of public services, in this case infrastructure projects, in order to favor their own election districts to win votes. But the larger the share of this investment that the district has to pay for by itself, i.e. the closer the district's income is to total income, the closer to the social optimum the representative wants to be. And if the district's income equals total national income, the representative would strive for the surplus maximizing level of public good provision.

The swing-voter theorem provides a second explanation. The origin of the swing voter model is Lindbeck and Weibull (1987) and Dixit and Londregan (1996). We complement this with lobbying à la Cadot et al. (2006). The basic model implies that voters not only have preferences over (public and private) consumption but also over ideological positions. Individuals who attach great importance to a party's ideological stand have an enduring tendency to support that particular political party and are therefore hard to swing, while voters who primarily value political parties for the consumption opportunities they provide are more attractive political prey. A major shift in allocation of public expenditures per capita is needed to swing the ideologically oriented voters in favor of the other block (Helland and Sørensen, 2009, pp. 9, 11).

We assume that two competing (blocs of) parties maximize their national vote by offering different levels of spending to election districts depending on the propensity of the voters in each district to 'swing' their vote (Helland and Sørensen, 2009). Districts that ex ante are believed to be affected in their choice on polling day by projects are therefore rewarded with new infrastructure. The swing voter model, including lobbying, is described in Appendix A.2. The swing voter model without lobbying yields two hypotheses:

**Hypothesis 2.** National transport infrastructure expenditure in an electoral district decreases as the share of district voters having strong party identification increases.

Helland and Sørensen (2009) call the weight given to consumption relative to ideology the 'greed parameter'. It measures how important consumption is to an individual relative to ideology. Districts with more ideologically oriented voters are expected to get a lower level of public good provision compared to districts that are more consumption oriented and therefore are easier to 'buy' with investments in public goods.

**Hypothesis 3.** National transport infrastructure expenditure in an electoral district increases as the cut-point density of the district increases.

Hypothesis 3 is based on the distribution of voters' ideological preferences and the density of the ideological distribution function at the ideological cut point. Since districts are characterized by different ideological voter distributions, electorates with high densities at the ideological cut point are politically attractive, since a more generous budget will shift a larger fraction of voters towards the party promising this carrot (Helland and Sørensen, 2009, p. 9).

A third candidate explanation is that local interest groups seek to convince parliamentary decision makers to allocate infrastructure funds to their home district. This is relevant if a district's electorate is not very volatile, that is, given that the above-described electoral concerns are not very strong (Cadot et al., 2006). The swing voter with lobbying model yields the following hypothesis:

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