The Political Economy of Transport Infrastructure Funds

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1 Introduction

In many countries criticism of the performance of infrastructure policies is heard. To lines of arguments are particularly prominent in this kind of criticism.

- Almost all proposals to increase transport infrastructure capacity by public private partnerships base the argument i.a. statements concerning the unavailability of public funds. These arguments are also made for public projects which pass the cost-benefit test.
- In many countries strong criticism is raised against an underfunding of maintenance of transport infrastructure. That is, even if the level of transport infrastructure expenditures were reasonable, the structure of expenditures on new investment and maintenance is considered to be inadequate.

In contrast to the scope and the frequency of the claim of underfunding of transport infrastructure investment there is very little empirical evidence to support the claims. Many of the macroeconomic studies which were inspired and used the format of the Aschauer study failed to support the assertion that the transport infrastructure investment level is too low. (e.g. Kopp, 2006)

There is very little systematic comparison of practical transport infrastructure policies with normative policy concepts. All of the examples which exist suggest, however, that actual policies are far removed from what was planned. The World Bank estimates, for example, that in Africa road stock to a value of US$ 45 billion was lost due to inadequate maintenance. This loss could have been avoided by preventive maintenance expenditures of only US$ 12 billion. (Brushett, 2005)

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A systematic review of such similar information revealed that in all countries in the sample of developing countries, actual expenditures were far below the planned expenditure levels. The highest value was 58 per cent and the lowest 15 per cent. (Gwilliam, 2006)

There was a major dispute between the World Bank and the International Monetary Fund on the question whether setting up of road funds would improve the performance of road funds would improve maintenance performance. (Potter, 2006) The World Bank argued that road funds would isolate maintenance policy from policy failures while the International Monetary Fund feared that the finance ministries would loose flexibility to design rational fiscal policies in changing economic environments. There was no consensus on how the road funds should be financed.

Recent research into the distortions introduced into infrastructure policies by the political process (Bardhan and Mookherjee, 2006a,b) suggest, that the isolation of transport infrastructure investment from the political process by delegation to independent agencies might improve the capital stock build up and maintenance. This would, however, require that a strict regulatory policy along the lines of the concept of a quasi-market for infrastructure services is credible.

In section 2 we will develop the argument that without political failures, from the perspective of welfare economics, there is no basis arguing for transport infrastructure funds. In section 3 we show how lobbying can influence infrastructure policies amounting to a welfare loss. Isolating infrastructure policies from the political process had then the chance to lead to overall welfare gains.

2 Optimal taxation

In this section we will present the argument that with the construct of the social planner of welfare economics, there is no theoretical argument in favour of infrastructure funds. Without taking account of the specifics of the political process, with governments acting like the benevolent social planner like in optimal taxation theory, the provision of infrastructure services and their finance by taxes would be indistinguishable from the provision of the services by a government-organised quasi-market being based on a infrastructure fund.

In the next subsection we will report the optimal tax financed solution (Diamond, 2003; Mirrlees, 1986; Guesnerie, 1998) and compare it to the quasi-market in the sub-sequent subsection. How lobbying may lead to infrastructure policies that differ from the optimum policies will be presented in the subsequent section. That section will discuss why the political actors whose initiatives lead to the deviations from the optimum might nevertheless agree to constitutional rules, limiting their own political discretion to implement in-

frastructure funds which isolate the provision and the finance of infrastructure services from the political process.

Optimal provision of tax-financed infrastructure services

Infrastructure services belong to a particular class of public goods. They are excludable, i.e. access to an infrastructure facility can be restricted without prohibitive costs, but, as long as there is no crowding, access should not be restricted as an increase of the use of the facility will lead to a lower resource cost per user, and thus to a more efficient use of resources.

There is a continuum of households, characterised by a parameter h. Each household is endowed with m^h units of the consumption good, with $m^h > 0$, h = 1,...,H. Households consume a (composite) consumption good c^h and transport infrastructure services η^h (h = 1,...,H). Preferences of households can be expressed by a smooth utility function $U^h(c^h, \eta^h)$ with

$$\partial U^h/\partial c^h \geq 0, \partial U^h/\partial \eta^h \geq 0 \tag{1}$$

$$\partial {U^h}^2/\partial^2 c^h \leq 0, \partial {U^h}^2/\partial^2 \eta^h \leq 0 \tag{2}$$

Households maximise utility wit respect to consumption of the private good and infrastructure services under the following budget constraint:

$$c^h + p_\eta \eta^h \leq m^h, \quad h = 1, ..., H. \tag{3}$$

with p_η denoting the price of infrastructure services. The price of the consumption good is normalized to one. m^h denotes the income of household h in terms of the private consumption good. Equilibrium demands are denoted by c^{h*} and η^{h*}. They are functions of the household incomes m^h and the (relative) price of infrastructure services. Re-inserting the optimal values into the individual utility function leads to the indirect utility function

$$V^h = V^h(p_\eta, m^h) = max\{U^h(c^h, \eta^h) : c^h + p_\eta \eta^h \leq m^h\} \tag{4}$$

The costs of infrastructure services depends on overall infrastructure use and is denoted by $\Gamma = \Gamma(\int_h \eta^h dh)$. Let total demand be denoted by Ψ. To account for the characteristics of transport infrastructure goods we assume that the cost function (in terms of the consumption good) is given by

$$\Gamma = \gamma_0 + \gamma\Psi, \tag{5}$$

where γ_0 denotes fixed costs that form a large share of the total costs. γ denotes marginal infrastructure costs. The costs function implies that, in the absence of congestion costs, the average cost of infrastructure provision will decrease with usage.

Based on the information of the indirect utility functions the social planner

will maximise social welfare which is a function of the (relative) price of infrastructure services and the incomes of the households in terms of endowments with the consumption goods m^h:

$$V = V(p_\eta, m^1, ..., m^H). \tag{6}$$

She or he faces the following budget constraint:

$$\int_h (m^h - c^{h*})dh + p_\eta \int_h \eta^{h*} dh - \gamma_0 - \gamma \int_h \eta^{h*} dh \geq 0 \tag{7}$$

The Lagrange function of the planner's optimisation problem is then

$$\mathcal{L} = V(p; m^1, ..., m^H) + \mu \left[\int_h (m^h - c^{h*})dh + p_\eta \int_h \eta^{h*} - \gamma_0 - \gamma \int_h \eta^{h*} dh \right] \tag{8}$$

Under the restriction that the first best level of private consumption should be preserved the first order condition for the optimal price of infrastructure services is

$$\frac{\partial V}{\partial p_\eta} + \mu \left[\int_h \eta^{h*} dh + p_\eta \int_h \frac{\partial \eta^{h*}}{\partial p_\eta} dh - \gamma \int_h \frac{\partial \eta^{h*}}{\partial p_\eta} dh \right] = 0 \tag{9}$$

Making use of the envelop theorem and its implications for the relationship between indirect utility and market demand, we know that $\frac{\partial V}{\partial p_\eta} = -\lambda\psi$, with λ denoting the marginal utility of income of private households. We then have as the necessary condition for the optimal supply of infrastructure services

$$-\lambda\psi + \mu\psi + \mu \left[p_\eta - \gamma \right] \frac{\partial \psi}{\partial p_\eta} = 0 \tag{10}$$

Recall that λ denotes the social utility of income in private hands, while μ denotes the social utility of income in the public sector. Given the concavity of the social utility function, both parameters should be equal in a situation of optimal taxation. With this the first two term on the left hand side of (10) disappear. The second term on the left hand side can only be equal to zero, if $p_\eta = \gamma$. In other words if prices are equal to marginal costs. All funding of the provision of infrastructure services has to be achieved by lump sum transfers.

Optimum transfers are calculated from first order derivatives of the Lagrangian with respect to the incomes m^h of households

$$\frac{\partial V}{\partial m^h} - \mu + \mu \left(p_\eta - \gamma \right) \frac{\partial \psi}{m^h} = 0 \tag{11}$$

$$\lambda - \mu \left(p_\eta - \gamma \right) \frac{\partial \psi}{m^h} = 0 \tag{12}$$

Notice that while the first order condition for the level of infrastructure services information on the aggregate demand function and the cost function for

the provision of infrastructure services was enough to take supply decisions, the determination of the optimal lump-sum transfers requires knowledge of individual utility functions. This has been the basis of a long-standing folklore that optimal lump-sum taxes are infeasible and impossibility theorems of Hammond (1979), Mirrlees (1986)and also Coate (1995). One pragmatic short-cut to the solution of the incentive incompatibility problem is the proposal of a flat tax. This would mean that the costs of infrastructure facilities that are not covered by marginal cost pricing are covered by fixed charges to all users.

Implementation rules for an infrastructure fund

Infrastructure policies could be delegated to an agency which runs an infrastructure fund. Given the fact that the ownership of an infrastructure facility potentially leads to powers as a natural monopolist, the social planner would try to regulate the agency to get as close as possible to the optimum conditions derived above. That is, the agency would be allowed to maximise its profit function by using a nonlinear pricing schedule under the proviso of zero profits.

The Lagrangian function would then be

$$\mathcal{L} = \Phi(p_\eta, K, t^1, ..., t^H) - \mu \left(p_\eta \psi + \int_h t^h - \gamma_0 - \gamma \psi \right), \tag{13}$$

with t^h denoting fixed charges by the agency. The optimum condition from first derivatives with respect to the price of infrastructure services, making use of Hotelling's lemma is then

$$\mu\psi - \mu\psi - \mu[p_\eta - \gamma]\frac{\partial \psi}{\partial p_\eta} = 0, \tag{14}$$

which implies marginal cost pricing and cost coverage by fixed charges. Without regulation the agency would try to price discriminate to turn consumer rents into monopoly or private rents.

The important result of this section is that without a political economy argument, or accepting the metaphor of the benevolent, omnipotent planner there is *no* argument for a delegation of infrastructure policy competencies from the government to an agency.

3 The political process

As argued in the preceding section cost recovery issues of transport infrastructure investment do not arise if fiscal policy decision making is perfect. In a direct democracy with perfect information transport infrastructure investment

levels would be determined by the median voter

The benefits of isolating the provision of infrastructure services from the political process are studied in a model of party competition and political influence of special interest groups. Grossman and Helpman (2001) Lobby groups influence political outcomes by influencing party platforms and by contributing to electoral campaigns. We consider a single electoral contest between two political parties, indexed by A and B. The election will determine the outcome of some fixed policy issues and some pliable issues. Parties might change their pliable positions to further their electoral chances. Parties are assumed to be able to credibly commit to party platforms. That is, parties are considered to care about their reputation to reliably carry out the announced if they should win the election. There are two classes of voters. *Strategic* voters base their decisions on where to cast there vote strictly on the analysis of the party platforms of the competing parties. A second class of voters, *impressionable* voters, are influenced by campaign advertising. The campaigns are funded by interest contributions. That is the impressionable voters are targets of campaign spending on the basis of donations by interest groups. Interests groups may also make contributions to parties contingent on the party platforms.

3.1 Voters

There is a continuum of voters with diverse tastes. The voters'utilities are assumed to be additive in the components reflecting their preferences with respect to the fixed and the pliable policy dimensions. A voter i ($i \in H$) belongs to an identifiable group j (j=1,...,J), of the measure N_j which shares a common interest with respect to the pliable policy issues. Individuals differ with respect to their utility derived from fixed, ideological positions of the parties. A strategic voter i in the group j has the utility function:

$$u_{ij} = u_j(\mathbf{p}^K) + v_{ij}^K, \tag{15}$$

with K = A,B. [1]

$u_j(\cdot)$ is the representative utility function of all members of the group j on the elements of party platforms $\mathbf{p^K}$ of the party K. v_{ij}^K represents voter i's utility from the set of ideological positions of party K. The pliable policy positions of interest here are those pertaining to infrastructure policy while the ideological positions are more general and will mainly concern policy issues outside the realm of transport policy.

The legislative operates by majority rule. It is therefore a weakly dominant

[1] Here parties run for office and the candidatures are exogenously given. For voters deciding to enter the political competition for a political office cf. Besley and Coate (1997) and Osborne and Slivinski (1996).

strategy for voter i to cast her or his vote for that party whose overall package of policy offers (the elements of the party platform plus the attractiveness on ideological positions) leads to a higher utility. That is, the strategic voter will vote for party A, and not for party B, if

$$\begin{aligned} &u_j(\mathbf{p}^A) + v_{ij}^A > u_j(\mathbf{p}^B) + v_{ij}^B, \quad or \\ &u_j(\mathbf{p}^A) - u_j(\mathbf{p}^B) > v_{ij}^B - v_{ij}^A = \nu_{ij} \end{aligned} \tag{16}$$

ν_{ij} measures the individual's preference for the fixed position of party B over the ideological position of party A. In case equally attractive parties there is an equal probability that voter i will vote for either party.

For convenience it is assumed that ν_{ij} is distributed uniformly with density f and mean b/f in the range

$$\left[\frac{-1+2b}{2f}, \frac{+1+2b}{2f}\right]. \tag{17}$$

The parameter b measures the extent to which the ideological positions of party B are more attractive to the group j overall. This means that party B wins a majority among the strategic voters if both parties adopt identical platforms ($\mathbf{p}^A = \mathbf{p}^B$) and b is greater than zero. On the other hand, with identical political platforms and $b < 0$ party A wins a majority of the votes. An increase in the parameter b increases the share of strategic voters who prefer the fixed positions of party B.

With these assumptions the fraction

$$s_j^S = \frac{1}{2} - b + f[u_j(\mathbf{p}^A) - u_j(\mathbf{p}^B)] \tag{18}$$

of the strategic voters in group j will vote for party A. If both parties enter the electoral competition with identical programs the expression for the share of the group j strategic voters voting for party A reduces to $s_j^S = 1/2 - b$. f is assumed to be small enough to fall between 0 and 1 for all feasible policy options.

The weighted sum of vote shares in the various groups j give the fraction of all strategic voters who favour party A. The appropriate weights are the shares of each group in the total number of strategic voters. With N_j being the measure of voters in group j and $N = \sum_{j=1}^{J} N_j$ being the total size of the electorate the fraction of strategic voters in each group is assumed to be exogenous and common to all groups. This share is denoted by μ. We then

have as the weighted sum of strategic voters voting for party A:

$$s^S = \frac{1}{2} - b + f\left[\sum_{j=1}^{J} \frac{N_j}{N} u_j(\mathbf{p}^A) - \sum_{j=1}^{J} \frac{N_j}{N} u_j(\mathbf{p}^B)\right] \tag{19}$$

$$= \frac{1}{2} - b + f[u(\mathbf{p}^A) - u(\mathbf{p}^B)], \tag{20}$$

where $u(\mathbf{p}^K)$ is the average utility component associated with the pliable policies of party K in the population of all strategic voters.

$(1-\mu)$ of the members of each group are non-strategic voters. Without arguing for their behaviour as a response to information costs, it is assumed that they respond to election campaign advertising, renouncing to the study of party programs. [2] Consequently, parties can win the votes of these voters only by campaign spending. How attractive a particular party is to these impressionable voters depends on the ideological positions of the party and campaign spending. The fraction

$$s_j^I = \frac{1}{2} - b + e(c^A - c^B) \tag{21}$$

of the impressionable voters of group j votes for party A when this party spends c^A on campaigns and the competing party B c^B. The parameter e measures the effectiveness of electoral campaigns. The higher e the smaller is the required campaign funding to win over a certain number of voters.

As the s_j^I are equal for every group j, we have

$$s^I = \frac{1}{2} - b + e(c^A - c^B), \tag{22}$$

with s^I being party A's share among all impressionable voters. Adding party A's share in strategic and impressionable voters, we obtain the party A's overall share of votes

$$\begin{aligned} s &= s^S + s^I \\ &= \mu\left[\frac{1}{2} - b + f[u(\mathbf{p}^A) - u(\mathbf{p}^B)]\right] + (1-\mu)\left[\frac{1}{2} - b + e(c^A - c^B)\right] \\ &= \frac{1}{2} - b + \mu f[u(\mathbf{p}^A) - u(\mathbf{p}^B)] + (1-\mu)e(c^A - c^B), \end{aligned} \tag{23}$$

where s is the total vote share of party A.

[2] On this view on the influence of campaign spending on election outcomes cf. Baron (1994). On campaigns having signaling value for voters see e.g. Prat (forthcoming).

3.2 Parties

Party leaders have to choose the political platform and the level of campaign expenditures to maximise the chances of the party to win the elections. The parameter b, which indicates the relative adherence of voters to the ideological positions of party B, is, by the time the parties have to define the party platforms, unknown to the party managers. The managers have probabilistic information on a random variable $\tilde{b}$, with $F_b(\cdot)$ being the perceived distribution function of $\tilde{b}$ by both parties.

Campaign spending is completely ineffective if all voters are strategic voters, i.e. $\mu = 1$: In this case, disregarding impressionable voters, party A chooses $\mathbf{p}^A$ to maximize the probability that $s > 1/2$, which is given by

$$F_b\left(f[u(\mathbf{p}^A) - u(\mathbf{p}^B)]\right).$$

Party B chooses $\mathbf{p}^B$ to maximise the probability that $s < 1/2$, which is given by

$$1 - F_b\left(f[u(\mathbf{p}^A) - u(\mathbf{p}^B)]\right).$$

This implies that both parties set the policies $\mathbf{p}^K, \quad K = A, B$ to maximise the utility of the average voter. That is, if all voters had full information about the party platforms and parties can credibly announce policy programs all parties would propose and implement the same set of policies.

If $\mu < 1$, campaign spending increases the number of votes. The election campaigns are entirely funded by contributions from special interest groups. The interest groups might link their contributions to the policy platforms proposed by the parties. Let $C_j^A(\mathbf{p}^A)$ denote the contribution schedule offered by group j to party A as a function of party A's campaign announcements and $C_j^B(\mathbf{p}^B)$ the offer of group j to party B, depending on party B's announced platform. Then the parties campaign budgets are given by

$$c^A = \sum_{j=1}^{J} C_j^A(\mathbf{p}^A), \quad \text{and} \tag{24}$$

$$c^B = \sum_{j=1}^{J} C_j^B(\mathbf{p}^B). \tag{25}$$

Combining the observations on how the parties maximise their chances to get a voter share of greater than one half, we have the following objective functions

of the parties:

$$G^A = \mu f u(\mathbf{p}^A) + (1-\mu) e \sum_{j=1}^{J} C_j^A(\mathbf{p}^A), \quad \text{and} \tag{26}$$

$$G^B = \mu f u(\mathbf{p}^B) + (1-\mu) e \sum_{j=1}^{J} C_j^B(\mathbf{p}^B) \tag{27}$$

Selecting the political platform $\mathbf{p}^K$ that maximises G^K maximises the probability that $s > 1/2$ for party A and the probability that $s < 1/2$ for party B. The objective functions indicate the policy makers' focus on the welfare of the electorate and campaign contributions. The higher the share of strategic voters, the stronger will be the emphasis on the welfare component. A narrowing of the ideological differences between the voters (represented by a higher f) has the same effect. When the ideological party adherence is reduced, voters' responsiveness to changes of the party platform will be increased. As seen before this would support a convergence of the platform of the different parties.

3.3 Interest groups

Interest groups interact with political parties to influence the choice of the party platforms or to enhance the chances of parties to win a majority. We see the interest groups as the principals of the winning party, along the lines of the menu-auction-model of Bernheim and Whinston (1986). It has been applied to study the political outcomes of pubic policy Dixit et al. (2002) and trade policy Grossman and Helpman (1994). As suggested by the above discussion, interest groups are ready to offer contributions to influence the parties' decisions. Each group independently designs a contribution schedule that associates a transfer to the party with every policy option available to it.

The objective functions of the parties are given by equations (26) and (27). The leaders of an interest group j try to maximise the expected utility of the group members net of the contributions paid to the party or parties. The have the objective function

$$E[N_j u_j(\tilde{\mathbf{p}})] - c_j, \tag{28}$$

where $c_j = c_j^A + c_j^B$ is the total of the contributions and $\tilde{\mathbf{p}}$ is the vector of policies enacted by the party that wins. The expectations operator reflects the group's uncertainty about who will win the election:

The interest groups formulate their contribution offers before the policy positions have been chosen. This requires that the contribution schedules are designed before the relative popularity of the parties is known. The contribution

schedules of the rival interest groups are common knowledge. The contribution schedule is designed to be a best response to the anticipated reactions of the parties to the contributions, taking the contributions of rival interest groups as given. On the basis of these anticipations group leaders calculate the probabilities with which each party will win. An expected winner is identified contingent on the realisations of $\tilde{b}$. Party A is expected to win the elections if there is a realisation of $\tilde{b}$ such that $s > 1/2$. This happens with probability $F_b(\Delta)$, where Δ, according to equations (26) and (27), is given by

$$\Delta = G^A - G^B = \mu f \left[u(\mathbf{p}^A) - u(\mathbf{p}^B)\right] + (1-\mu)e(c^A - c^B). \tag{29}$$

Given this the interest group attaches a probability $F_b(\Delta)$ to the event that $\mathbf{p} = \mathbf{p}^A$ and a probability 1-$F_b(\Delta)$ to the event that $\mathbf{p} = \mathbf{p}^B$. The interest group's objective function is then

$$U_j = F_b(\Delta) N_j u_j(\mathbf{p}^A) + [1 - F_b(\Delta)] N_j u_j(\mathbf{p}^B) - c_j^A - c_j^B. \tag{30}$$

Since there is a positive probability that either party will win the interest group leaders might well contribute to both parties, bending the platforms towards the group members interest. They consider which platform would be best for the interest group members, taking into account the incentives facing the political parties. To estimate their influence they identify the benchmark platforms the competing parties would define in the absence of any contributions of group j. They design contributions for the competing parties A and B, bearing in mind that there might be limits to the parties willingness to accept the offered contributions.

More specifically, let p_{-j}^A and p_{-j}^B denote the platforms that the two parties would adopt in the absence of any contributions from the interest group j. These policy vectors maximise the chances of the parties with the contribution functions of interest group j being equal to zero over their entire domains. Let G_{-j}^A and G_{-j}^B be the objective function values the parties can achieve under the non-participation of group j in the political process, i.e.

$$\begin{aligned} &\mathbf{p}_{-j}^K = arg \quad \max_{\mathbf{p}} \mu f u(\mathbf{p}) + (1-\mu) \sum_{\{l \in J: l \neq j\}} C_l^K(\mathbf{p}) \quad \text{and} \\ &G_{-j}^K = \mu f u(\mathbf{p}_{-j}^K) + (1-\mu) f \sum_{\{l \in J: l \neq j\}} C_l^K(\mathbf{p}_{-\mathbf{j}}^{\mathbf{K}}), \quad \text{for K = A,B.} \end{aligned} \tag{31}$$

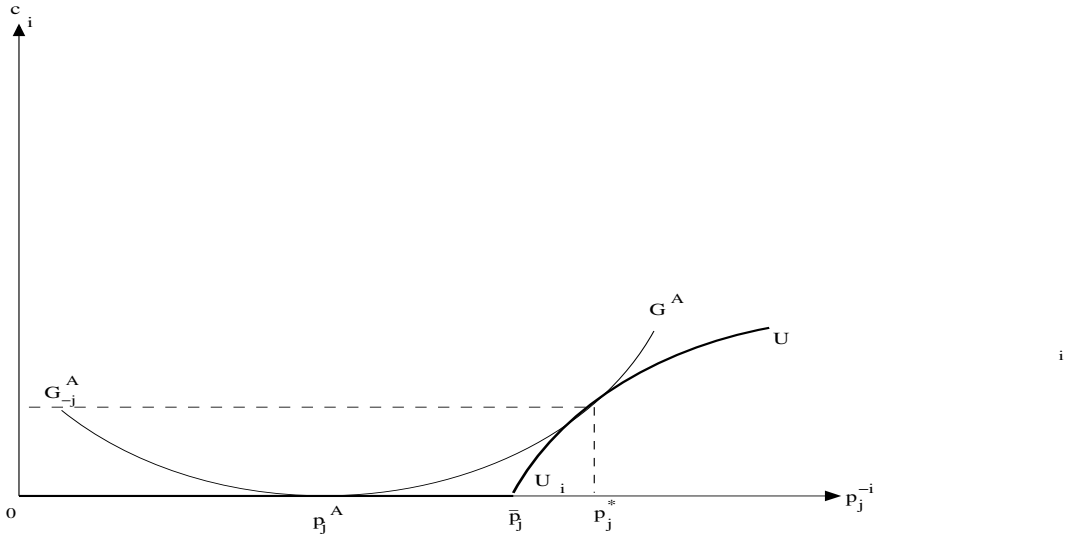
The leaders of the interest group j must then choose p_j^A and p_j^B and contribution levels c_j^A and c_j^B to maximise its objective function (30) subject to the constraints $G^A \geq G_{-j}^A$ and $G^B \geq G_{-j}^B$.

Whether the latter constraints are binding characterises the political influence of the interest groups. If for example $G^A = G_{-j}^A$, it means that party A is just indifferent between announcing the platform $\mathbf{p}_j^A$ preferred by group j relative to

the policy vector in case of non-participation and rejecting group j's offer. The indifference implies that the acceptance of the contribution does not enhance the chances of party A to win the elections. Therefore a binding constraint means that the interest group considers a contribution to party A only to influence the policy platform of party A. In contrast, if $G^A > G^A_{-j}$ the group contributes more than would be necessary to influence the policy proposal of the party. The only reason why the interest group might want to spend more than the amount required to induce the desired change in the policy proposal is to increase the probability that party A wins the election. That is, if the constraint is not binding a electoral motive for campaign giving dominates.

Figure 1 illustrates the situation when the constraint is binding. The group then solves the constrained maximization problem, choosing $\mathbf{p}^A_j$ and c^A_j to maximize $U_i(\mathbf{p}^A, c^A_i)$. The solution is found at a point of tangency between one of the interest group's indifference curves and an indifference curve of party A.

Figure 1: Determination of the Contribution Schedule



The indifference curve of the party passes through the point $(\mathbf{p}, 0)$, reflecting his or her concern about other interest groups. To deviate from this policy vector the interest group has to make a positive contribution. The compensating schedule, depicted by the solid line for the individual policy component $p_j < \hat{p}_j$, has the shape of the utility function whenever contributions are positive. Confronted with this schedule, it is optimal for the party manager to choose p^{A*}_j.

With more than one lobby group there is no clear-cut connection between a

party's ex ant prospects of victory and the extent of its changing of the party platform to accommodate the interest of the interest group. The expectation that some party will prove a better fund raiser than its rival can become a self-fulfilling prophecy in a game with independent contributors.

Each interest group j is one of several different organised interest groups. The group's objective function is given by equation (30). Each group chooses $\mathbf{p}_j^A$ and $\mathbf{p}_j^B$ and contribution levels c_j^A and c_j^B to maximise this function under the constraint that the entry of group j into the game does not reduce the effectiveness of either of the parties, i.e. $G^A \geq G_{-j}^A$ and $G^B \geq G_{-j}^B$. In doing so the interest group takes the contribution schedules of the other interest groups as given. In an equilibrium, the choices by each group are best responses to the schedules offered by the others and the platforms selected by the different lobbies coincide.

Before discussing the consequences of competition of interest groups to influence the policy platforms of the parties running for office, we point out that in a political process as set out here it is almost impossible that two interest groups support the same party for electoral motives.

Suppose that interest group j contributes to party A beyond the point of what is required to change the party platform to better serve the interest of the groups, i.e. $G^A > G_j^A$. In this case the size of the contribution is determined by the first order condition

$$F'(\Delta)e(1-\mu)N_j\left[u_j(\mathbf{p}^A) - u_j(\mathbf{p}^B)\right] = 1, \tag{32}$$

where

$$\Delta = \mu f\left[u_j(\mathbf{p}^A) - u_j(\mathbf{p}^B)\right] + (1-\mu)\left[\sum_{k=1}^{J}(c_k^A - c_k^B)\right]. \tag{33}$$

The first order condition equates the expected marginal benefit from the last dollar given to party A (on the left hand side) to the marginal cost which is 1. The marginal benefit reflects the effectiveness of the dollar in improving the party's chances of winning, and the interest group's relative preference for the pliable platform of party A relative to that of party B.

Some other lobby m may also consider to make contributions to party A for electoral motives. The first order condition for the optimality of the contribution for group m would be

$$F'(\Delta)e(1-\mu)N_m\left[u_m(\mathbf{p}^A) - u_m(\mathbf{p}^B)\right] = 1. \tag{34}$$

But then equations (32) and (34) imply that

$$N_j \left[u_j(\mathbf{p}^A) - u_j(\mathbf{p}^B)\right] = N_m \left[u_m(\mathbf{p}^A) - u_m(\mathbf{p}^B)\right] \tag{35}$$

That is, if two interest groups make electorally motivated contributions to one party they must have the same preferences with respect to the party's pliable policy positions. In view of the assumption that the members of groups have identical preferences for party platforms, one would expect members of group j and group m to be members of the same lobby group. More generally, the reason why it is unlikely that more than one interest group supports one party for electoral reasons is the fact that each group will have an incentive to take a free ride. All of the lobbies which prefer $\mathbf{p}^A$ to $\mathbf{p}^B$ would like to have the probability of a victory by party A increased. But all would at the same time to free ride on other groups to improve the chances of party A to win the elections. In equilibrium only one group will contribute for electoral motives, the lobby that benefits most from a change of the party's platform, which is in the interest of other groups as well.

3.4 The cost of lobbying

Is it possible to explain the unsatisfactory infrastructure policy outcomes mentioned in the introduction, like the widespread perception of a lack of funding for infrastructure projects which have passed the test of a Cost-Benefit-Analysis and the underfunding of infrastructure maintenance, in the present framework of a model of political economics?

To give one such explanation we note that in a multiparty lobbying context it is very well possible that the party which is considered to be the favourite party ex ante, in the sense that it would win a majority if all voters were informed voters, does not necessarily win the elections. As set out in subsection 3.2, if all voters were informed voters the probability of the parties winning the election depends on the difference between their party platforms. None of the parties could do better than to adopt the party platform that maximises the utility of the average voter. Therefore both parties will present identical platforms in equilibrium. Which party wins the election is entirely determined by the voter loyalties resulting from its ideological image.

Now define lobby group j as the lobby group whose informed members strongly care about a "rational" infrastructure policy, as understood on the grounds of welfare economics and cost-benefit analysis. Other groups $l \in J$ focus on other policy objectives, leading to an interest in a relatively low priority for transport infrastructure policies. This might be due to a relatively low demand for transport services and therefore for its intermediate public goods or to a general concern about the external costs of the transport sector. Environmental or transport safety groups do sometimes rather propose to contain the expansion

or a reduction of transport activities than propose specific measures to correct the negative externalities associated with the transport sector. A less analytic approach to the reduction of environmental costs might have to do with extrinsic policy motivations like the 'warm glow' that has been found to be associated with the valuation of environmental goods in studies on contingent valuation studies (Diamond and Hausman, 1994). Similar motivations might be the basis of interest groups favouring an exuberant expansion of transport infrastructure, associating higher transport costs with the curtailing of basic rights. Extrinsic motivations could be the basis of a greater responsiveness to electoral campaigns. If this were so, interest groups whose members base their policy views relatively strongly on extrinsic motivations may have a relatively high share of 'impressionable voters'. Differences in motivations of the individual members of interest groups could then be a basis for systematic differences between interest groups in their shares of informed and impressionable voters.

Let us assume that party A would win the election if all voters were informed and party platforms would converge in the sense of Downsian party competition. That is, if $\Delta = 0$ and $F_b(\Delta) = F_b(0) > 1/2$, party A would win the election. The ex ante winner of the election, party A, would implement a policy program that maximises the welfare of the weighted sum of social groups, the weights for the representative citizen of the individual groups being identical to the population shares of these groups.

Now assume that there are uninformed voters. When lobby group j is contemplating entry into the policy game it is *not* necessarily in the situation of being the lobby group that has reason to contribute to the election campaign of party A. This would only be the case if party A were the expected winner of the election when considering to enter the political economy game. More formally, if

$$F_b(G^A_{-j} - G^B_{-j}) > \frac{1}{2}. \tag{36}$$

This is, however, not the case if other interest groups give more generously to party B than to party A in the absence of the participation of group j in the political process:

$$\Delta_{-j} = G^A_{-j} - G^B_{-j} = f\left[\sum_{l\in J:l\neq j} \mu_l \left(u_l(\mathbf{p}^A_{-j}) - u_l(\mathbf{p}^B_{-j})\right)\right] + e\sum_{l\in J:l\neq j} (1-\mu_l)\left[C^A_l(\mathbf{p}^A_{-j}) - C^B_l(\mathbf{p}^B_{-j})\right] \tag{37}$$

There is no à priori reason for Δ_{-j}, according to (37) not to be such that

$$F_b(G^A_{-j} - G^B_{-j}) < \frac{1}{2}, \tag{38}$$

despite the fact that $F_b(0) > 1/2$, in the hypothetical situation that all voters are informed voters, which would imply the implementation of a welfare economic optimum. This would be the case if the second term of the sum on the right hand side of equation (37) were negative and much larger in absolute terms than the first term.

Unless group j is the only group which supports party A with an electoral motive, i.e. has such strong preferences for bending the party platform of party A that it takes a lead in contributing to the electoral campaign of party one, it will support party B more strongly than party A. This support will exclusively be motivated by influencing the platform of party B, without contributing to the electoral campaign as party B is already the expected winner of the electoral contest. In the infrastructure policy context, this could mean that interest groups with a focus on other policy portfolios, or with motivations that assign a small role to common infrastructure planning models contribute strongly to influence impressionable voters such that a party, which would look like the likely winner of election if all voters would find the interest, time and resources to thoroughly analysis policy platforms, has less than fair chances to win the elections in the actual policy decision making process.

A closer look at the optimal contribution of group j to party A to influence its party platform gives some indication under which conditions could be the case. The contribution of, for example, interest group j to party A is derived from the constraint of party A being willing to change the party platform in return for contributions being binding, i.e. $G^A = G^A_{-j}$. This implies

$$f \sum_{j=1}^{J} \mu_j u_j(\mathbf{p}^A) + e \sum_{l \in J: l \neq j} (1-\mu_l) C_l^A(\mathbf{p}^A_{-j}) + (1-\mu_j) e c_j^A \\ - f \sum_{l \in J: l \neq j} \mu_l u_l(\mathbf{p}^A_{-j}) - e \sum_{l \in J: l \neq j} (1-\mu_l) C_l^A(\mathbf{p}^A_{-j}) = 0 \quad (39)$$

The expression for the contribution of group j to party A is then

$$c_j^A = \frac{f}{e(1-\mu_j)} \left[\sum_{l \in J: l \neq j} \mu_l u_l(\mathbf{p}^A_{-j}) - \sum_{j=1}^{J} \mu_j u_j(\mathbf{p}^A) \right]. \quad (40)$$

Similarly, the contribution to party B to shape its electoral platform would be

$$c_j^B = \frac{f}{e(1-\mu_j)} \left[\sum_{l \in J: l \neq j} \mu_l u_l(\mathbf{p}^B_{-j}) - \sum_{j=1}^{J} \mu_j u_j(\mathbf{p}^B) \right]. \quad (41)$$

The minimum transfers of group j to influence the party platforms are c.p. the higher

(1) the greater the (uniform) density of voters f, i.e. the smaller the spectrum of ideological positions within the electorate,

(2) the smaller the effectiveness of electoral campaigns e,
(3) the higher the share of informed voters in the other interest groups and to a lesser extent the higher the share of informed voters in group j,
(4) the greater the loss of the informed average voter by group j entering the political process and bending the party platforms to its advantage.

The last argument is of particular importance if policies cannot be marginally adjusted but a platform that is more favourable to group j requires large discrete steps as there are indivisibilities in policies. Given the network character of transport infrastructure and the indivisibility of transport infrastructure facilities this could weaken infrastructure plans which are based on applied welfare economics, in particular if investment decisions are taken by small communities. [3]

The higher the payments derived from the condition that the parties accept the contributions of group j to influence the party platforms the more likely it is that the members of group j don't agree to the minimum payments as it does not increase their utilities, what ever mechanism is chosen to distribute the burden of the contributions among the members of the group.

4 Conclusion

To summarize, motivational differences between interest groups which favour infrastructure policies that follow plans based on applied welfare economics and other interest groups who assign a low priority to the transport sector in general might have the consequence that

- a group aiming at a greater importance of sound infrastructure planning has reason to contribute to campaign spending of parties to mobilize uninformed voters,
- an à priori expected winner of the electoral competition which would implement infrastructure policies that are based on sound economic analysis if all voters were well informed, has chances of less than one half to win the elections.

In these cases, the isolation of infrastructure policies from the political process, the often postulated "depolitisation" of infrastructure policies would improve overall welfare. It would implement policies which would be supported by the average voter in equilibrium if all voters were informed voters.

Such an isolation of infrastructure policies could be brought about by the delegation of planning and implementation of transport infrastructure capacity choice and maintenance to agencies which are subject to independent regula-

[3] On the consequences of the indivisibility of policies on the political equilibrium in a different context cf. Besley and Coate (2001).

tion.

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