Examining the Influence of Political Factors on the Design of a New Road

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Abstract Transport policy is often influenced by political factors. The few existing studies on this topic analyse patterns arising from a series of past decisions. This chapter adds to this knowledge by exploring the implications of political bias in the design of an individual project. The objective is to compare socially and politically optimal decisions for different hypothesis about the level and nature of political bias. GIS methods are used to derive route alignments for a new road, taking into account the level and distribution of community severance effects. The results show that even when bounding the problem with several restrictions, attending to political interests leads to deviations from the social optimum, producing alignments not only with higher aggregate severance impacts, but also with higher land use costs and important distributional effects.

1 Introduction

The political organizations responsible for public policies are not neutral and have their own interests and motivations. The pursuit of these interests may clash with the social good. This means that a politically-biased policy may lead to an allocation of resources and distribution of benefits and costs that is not consistent with society's views on broad objectives such as economic efficiency, social equity or environmental sustainability. In general, the application of public policies is subject to the interaction of three different types of political structures: political parties, interest groups and social movement organizations (Burstein and Linton 2002). The decisions of policy-makers may then depend on their assessment of

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potential electoral gains or losses and may be permeable to lobby pressures or to protest by the local populations affected by the policy.

The influence of political factors is especially relevant in the case of transport planning, due to the asymmetry between the political power of well-organized lobbies, such as the car industry, and the power of other potentially interested parts, such as local business organizations, residents' associations, small environmentalist groups and non-car users. For example, Hillman (1997, pp. 72–77) argues that pedestrians and cyclists are systematically discriminated against in public policy, at the level of information gathering and decision-making. Empirical studies have also proved the influence of political factors on the regional allocation of investments in transport infrastructure (Congleton and Bennett 1995; Castells and Solé-Ollé 2005, Walden and Eryuruk 2012; Jussila Hammes 2012) and on decisions about investment and disinvestment in public transport infrastructure (Boschken 1998; Brent 1976). Delays and failures to introduce policies such as congestion charges and traffic restriction are also linked to the lack of public acceptability and to the socio-political characteristics of the population affected (Schade and Schlag 2003).

While there is scarcely any empirical evidence on the hypothesis of political bias regarding the distribution of the environmental effects of transport, some conclusions can be imported from studies of policies in other sectors. The question is often approached in reference to the principle of environmental equity. Camacho (1998, p. 18) argues that environmental inequalities arise because the governments depend on the resources of upper-class groups and large business. Several studies have shown that differences in the communities' political characteristics and especially in political power may explain options taken in environmental policy and in the location of pollution facilities leading to disadvantages for low-income groups and racial minorities (Hamilton 1993, 1995; Brooks and Sethi 1997; Earnhart 2004).

This chapter adds to the literature by focusing on the role of political aspects at the level of individual transport projects, focusing on the case of the construction of a new arterial road. Existing empirical work in both transport and non-transport sectors deals with broad options, where the influence of political factors operates at the level of discrete choices, either between the implementation or not implementation of a project and between the different locations of the project. There is however a lack of knowledge on the sensitivity of the design of specific projects to the influence of political factors, in the cases where the social worth of the project and the area of implementation have already been decided. While Taylor et al. (2010) show that the policy-maker is permeable to political influences at the stage of route alignment of new transport infrastructure, these influences have not been studied by reference to the political characteristics of the populations living in the neighbourhoods potentially affected by the project.

The production of further knowledge on this question is especially relevant in the case of urban transport projects, as the different alternatives for the alignment of the new project imply different distributions of local environmental effects among neighbourhoods, given the necessity for the project to cross areas with generally high population densities. In addition, the influence of political factors may also be limited by geographic constraints and opportunity costs in terms of land use. The potential for introducing political bias in road projects then depends on the usually small set of feasible options available to the policy-maker.

The chapter also introduces two methodological novelties. The first one regards the definition of the political motivations of the policy-maker. Existing studies have worked with a priori measures of political pay-off, such as voters in specific parties or the probability of local populations of engaging in collective action. However, these measures may not be representative of the political interests of the policy-maker or may give only a partial view of those interests. Our approach is to assess the implications of different hypotheses about the nature of the motivations of the policy-maker. The focus is not on the behaviour of a specific political party but on an abstract policy-maker, whose political interests are multidimensional and depend on the political characteristics of the populations affected by the project. These characteristics are found adopting a data-driven approach.

The second methodological novelty is to evaluate route alignments considering their impact on community severance. This impact is one of the major sources of social and political protest at the local level following the construction of new transport infrastructure. However, severance effects are seldom analysed quantitatively, either in official evaluation studies comparing different alternatives for the infrastructure or in academic studies focusing on patterns arising from past policies.

The study is supported by a geographic information system (GIS) in all stages. An indicator of community severance is defined at the level of the census enumeration district, based on the connectivity of the district with a series of possible destinations for pedestrians. We then estimate the potential changes in community severance in all districts when the road crosses a given point. This information is used to derive the spatial distribution of the political costs of severance. These costs is defined in alternative ways, depending on the weights attributed to the variables that define the political characteristics of the population affected. An optimal path algorithm is then used to derive the route alignments that minimize political cost. These alignments are compared with the one proposed in municipal master plans and with the "socially optimal" alignment, defined as the one that minimizes aggregate severance effects. The comparison uses statistics based on the overlay of the alignments with other geographic information, such as land use and the socio-economic structure of the population.

The chapter is organised as follows. The next section describes the project and defines the optimal route alignment problem. We then analyse the political structure of the population potentially affected by the project, deriving vectors of variables used in subsequent analysis. The main section of the chapter presents the politically-optimal routes and compares them with the planned and socially-optimal routes. The final section concludes the chapter, discussing the results and suggesting questions for further work.

2 Problem Definition

The case study is a proposal for a new road in the Lisbon Metropolitan Area (Portugal), linking Lisbon with two municipalities to the west (Cascais and Oeiras). This road is a project planned at the municipal level and figures in the municipal master plans of both municipalities as “Via Longitudinal” (Longitudinal Road). The purpose is to create a new access corridor to Lisbon, improving the accessibility of an area that lacks a clear network of arterial roads and direct access to Lisbon. The new road will also ease congestion on the existing motorway crossing the middle part of both municipalities and contribute to a more rational distribution of road traffic at the entrance of Lisbon, when used in conjunction with a future arterial road in the western part of this city. However, as the main longitudinal arterial road in the region, the project will have multiple lanes and high levels of traffic and average speeds, with potential effects on local mobility, accessibility to local urban facilities and inter-community interaction. These effects apply not only to walking trips but also to trips by bicycle or local buses, as these trips will suffer delays and will be associated with increased accident risk and increased exposures to noise and air pollution at the intersections with the new road.

The analysis in this chapter captures concerns on these effects by using an indicator of community severance defined at the level of the census enumeration district. In the construction of this indicator, we assume that the population in each district has a specific set of potential pedestrian destinations. This set is obtained by a sampling process that ensures that each district has between 4 and 12 destinations at a maximum distance of 800 m. In each district, we assign to each destination an attractiveness score, equal to its population density corrected by a factor depending on distance. The indicator of community severance in the district is then the attractiveness score of the pedestrian destinations that cannot be reached on the street network unless crossing large transport infrastructure, given as a proportion of the attractiveness score of all the destinations of that district.

The use of community severance has methodological advantages over other indicators of the local environment costs of the project, as it depends only on the location of infrastructure (and not on traffic levels) and allows an unequivocal identification of the set of neighbourhoods affected when the road crosses a given point, as the road will not cross any walking route more than once. The effect on each neighbourhood can be estimated by selecting all the routes that link the neighbourhood with its pedestrian destinations and that cross that point. This information is then used to estimate the proportion of population-interaction potential that those routes represent in the set of all destinations of the neighbourhood.

Figure 1 illustrates the elements used to define the optimal route alignment problem. The routes link the two future junctions with the existing network, as defined in the municipal master plan, and are calculated over a cost surface modelled with GIS raster data with a resolution of 40 m. The set of feasible areas is restricted to a corridor, based on the rationale of the project. This corridor is defined by existing or planned motorways, except in the north part, where it

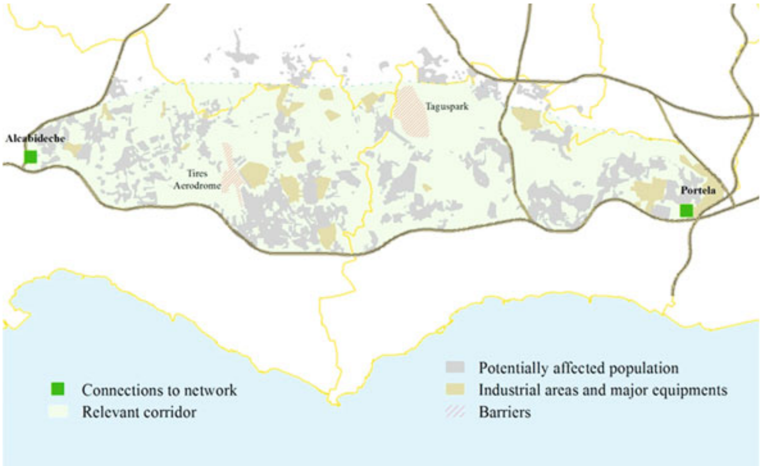

Fig. 1 Elements for the estimation of optimal routes for the *Via Longitudinal*

follows roughly the borders of the two municipalities. The districts potentially affected by the new road are the ones for which at least one destination is only reachable by crossing a point inside the relevant corridor. We also restrict the new road from crossing a set of areas inside the corridor, including an aerodrome, a large office park and locations with special cultural or environmental importance, given in the Portuguese National Gazetteer. Further restrictions are imposed on residential areas, industrial sites and major urban facilities, where the road can only use the space already accommodating arterial roads. This condition implies that in that space, the project corresponds to the upgrade of existing roads and not to the construction of a new road. We allow the same possibility in the space occupied by the three transversal motorways bordering and crossing the area, which are thus included in the feasible space for the new road.

The politically optimal route alignments minimize the political value of the aggregate community severance effects across the region (C_r). We assume that there is a single policy-maker, that is, the same party is holding the governments of the two municipalities involved. Political value is obtained by assuming that the policy-maker places a higher weight on the effects on the population with certain political characteristics, measured by a set of standardized factors described in the next section. The cost of the road crossing point r is then the sum of the severance effects in all the i affected enumeration districts ($\Delta CS_{r,i}$), weighted by population POP_i and by an exponential function of one of the political factors (P_x). The parameter ε measures the degree of priority assigned to the areas where the political factor is above the mean (that is, above 0). The value of this parameter is zero when the political factor is below the mean.

$$C_r = \sum_i POP_i * \Delta CS_{r,i} * Exp(\varepsilon * P_x)$$

The socially optimal route corresponds to the case $\varepsilon = 0$, that is, when no weights are placed on the political characteristics of the populations affected by severance. In this case, the route minimizes the sum of severance effects in all district weighted by their population.

3 Mapping the Political Landscape

The analysis in this section extracts from elections data a set of components measuring the political characteristics of the population in the areas affected by the project. These components are interpreted as independent elements in possible political strategies for the policy-maker. They may or may not correspond to the interests of a specific political party, as those interests depend on the political context at the time of decision and the strategy adopted by the party (for example, the choice between focusing on securing votes or on attracting new votes).

The hypothetical moment of decision for the projects is 2001. We consider that the political characteristics of the population in each area can be observed in the set of all elections hold in Portugal since 1991. The data come from the official election results database and include seven elections, for the central and local governments and for European Parliament. For each election, we define six variables. The first two variables are the vote shares of the two parties that dominate the political spectrum in Portugal, labelled in this study as “Orange” (right wing) and “Pink” (left wing). As possible indicators for social protest, we include the shares of blank and null votes and the shares of a set of left-wing parties with traditionally active militancy and labelled “Red”. As issues of community severance have an environmental dimension, it is also relevant to include the vote share of the two Portuguese environmental parties, labelled as “Green”. The final variable is the abstention rate, which can assess both the probability of electoral gains and the potential for social protest.

Possible electoral gains and losses for a party depend on the size and loyalty of its electoral base in each neighbourhood, while similar considerations apply to the probability of social protest, as measured by associated voting patterns. As such, we construct two sets of variables aggregating the data from the seven elections considered, containing the averages and the standard deviations of the variables defined above. The two sets of variables are then entered in the factor analysis.

The analysis is conducted at the level of the smallest administrative area (*freguesia*—civil parish) and as such, the resulting factor scores need to be disaggregated at the enumeration district level. This is achieved by estimating a regression model between the political factors and five socio-economic factors: Age, Qualifications, Urbanization, Slums and Migration.[1] The model is used to

[1] The Migration factor is related to variables such as length in current residence, place of birth, single-person households, shared dwellings and proportion of males in the adult population.

predict the political characteristics of the population in each district. The five factors were obtained by a previous factor analysis to census data at the enumeration district level and then averaged at the level of the administrative area.

Tables 1 and 2 show respectively the results of the factor analysis and the regressions between political and socio-economic factors. The factor models are satisfactory, extracting high proportions of the total variance and of the variance of each individual variable (as shown by the value of the communality), while the goodness of fit of the regression models is satisfactory for the three political factors.

The most distinctive factor (P1), explaining half of the variance in the dataset is the "Left" versus "Right" ideological opposition. This factor is characterized by high loadings on the historical averages of the shares of the parties representing the two ideological poles and by high loadings with opposite signs on the standard deviations of those shares. The regression models show that this factor is mainly explained by socio-economic status and to a smaller degree, by age and urbanization levels. The second factor (P2) groups variables suggesting the level to which communities participate in the political process. The variables with high negative loadings within this factor are the abstention rate and the shares of blank and null votes. The main explanatory variable for the factor is urbanization levels.

Table 1 Factor analysis of elections data (1991–1999)

		P1 Left	**P2** Political	**P3** Potential	*Communality*
% of variance		50.2 %	18.6 %	14.8 %	
Averages	Orange	−0.96	−0.08	−0.16	0.94
	Rose	0.92	−0.10	0.21	0.90
	Red	0.91	0.29	0.00	0.91
	Green	0.88	0.34	−0.02	0.89
	Blank/Null	0.50	−0.71	0.24	0.81
	Abstention	0.38	−0.68	−0.45	0.82
Std. Errors	Orange	0.71	−0.10	0.62	0.89
	Rose	−0.29	−0.68	0.63	0.94
	Red	−0.72	0.25	0.25	0.64
	Green	−0.92	−0.11	0.22	0.91
	Blank/Null	−0.54	−0.50	0.05	0.55
	Abstention	−0.18	0.51	0.75	0.85

Table 2 Regression between political and socio-economic factors

	P1	**P2**	**P3**
S1 (Age)	−0.24	−0.25	−0.11
S2 (Qualifications)	−0.84	0.08	0.24
S3 (Urbanization)	0.21	0.90	−0.52
S4 (Slums)	0.10	−0.33	−0.47
S5 (Migration)	0.19	0.10	−0.33
$\mathbf{R^2}$	**0.85**	**0.68**	**0.58**

The third factor (P3) is related to a low but variable abstention rate and to the variability in the shares of the Orange and Rose parties. This can be understood as a measure of the potential for both parties to attract new voters. This factor depends negatively on the urbanization level, location of slums and migration.

4 Politically-Optimal Route Alignments

4.1 Routes

This section presents the optimal routes obtained for costs based on the political factors obtained above. In the case of the first factor (Left *vs*. Right), the analysis considers both the factor scores (Left) and their symmetrical (Right). The estimation of the optimal routes uses Dijkstra's least-cost algorithm, implemented in ArcGIS 9.2 Spatial Analyst. Figure 2 shows for each political factor, the optimal route alignments obtained for different value of the parameter ε. The routes are mapped in Fig. 3, which also includes the route of the project as planned. The estimation produced five different politically-optimal routes. Route Ao1 is the socially-optimal route.

All the estimated routes differ considerably from the route as planned, especially in the middle section where they cross an area 1–1.5 km to the north. The consideration of community severance is decisive in this shift, as the routes cross through vacant land, reducing the separation of communities. In addition, in the

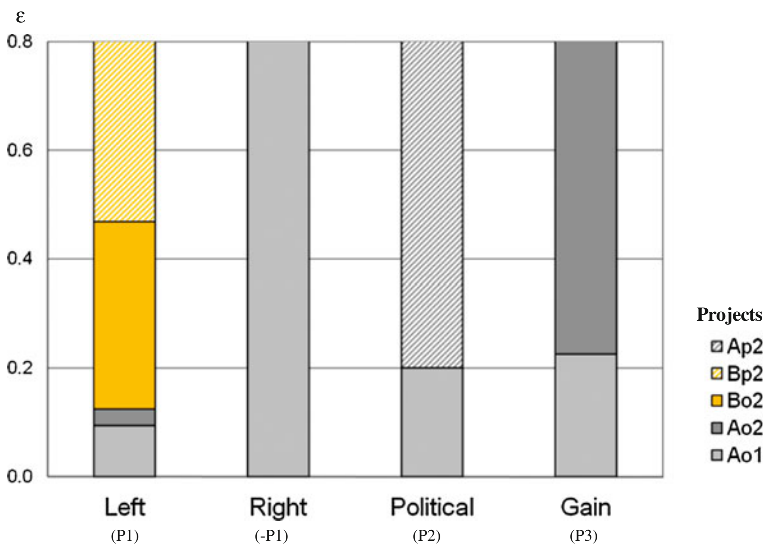

Fig. 2 Politically optimal routes: Project locus

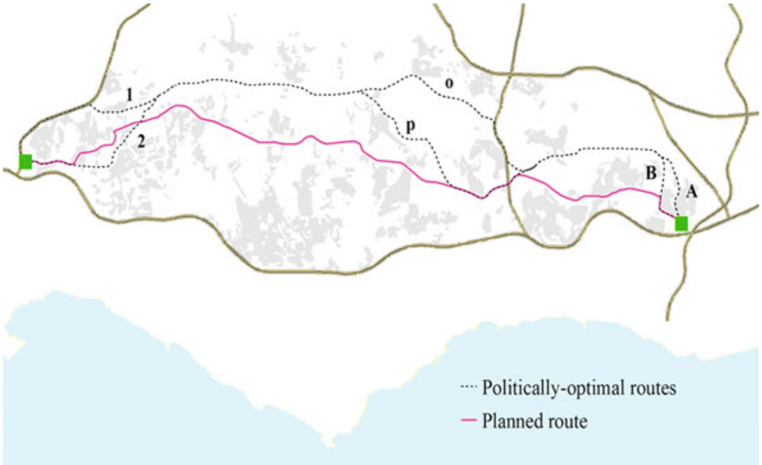

Fig. 3 Politically optimal routes and the planned route for the *Via Longitudinal*

eastern end of the road, the routes overpass one town, while the planned route is an upgrade of an existing arterial road crossing the town.

The figures shows that the consideration of political interest produces the same project as the socially optimum when the weights are placed on the right-wing factor [-P1], regardless of the value of the parameter ε. On the other hand, the project is sensitive to the size of the weights placed on the left-wing factor [P1]. As we consider higher values for the parameter ε, the route first changes in the western end (from *1* to *2*), then in the eastern end (from *A* to *B*) and finally in the middle section (from *o* to *p*). The first of these changes also occurs when we place weights on the factor measuring potential electoral gains [P3], but for higher values of the distributional parameter. The first and third shifts also occur when we place weights on the factor measuring the degree of attachment to politics [P2], but without a shift in the eastern end of the road.

The analysis that follows focuses on the effects of weights placed on the P1 and P2 factors. The effects of the P3 factor are understood as a particular case of the effects of the P1 factor, as the route obtained for P3 is also obtained in an interval of values for the parameters defining the weights placed on P1.

4.2 *Efficiency*

Table 3 gives statistics of the routes for several elements of cost. The comparison of the statistics of the politically-optimal routes and the socially-optimal route (Ao1) provides insights on the efficiency loss associated with the former. The length of the road is an approximation to the financial costs of the project. Length is also multiplied by a factor depending on slopes, to account for differences in

Table 3 Length, community severance and land use of politically-optimal routes

	Length (km)	Length x slope	Severance (000)	Land use (%)		
				Built-up	Agricultural	Ecological
Ao1	20.19	37.3	6.7	8.4	2.3	9.6
Ao2	20.17	37.9	7.4	14.6	3.7	16.3
Bo2	20.24	37.7	8.5	15.9	3.7	16.3
Ap2	20.40	38.6	7.7	17.4	14.2	15.2
Bp2	20.47	38.4	8.8	18.7	14.1	15.2
Plan	18.7	33.6	16.4	25.4	16.7	24.2

relief in the region. Aggregate severance costs are the sum of changes in the severance indicator across all districts weighted by their population. The percentage of the road length on built-up land (residential and non-residential) is an indicator of local costs such as exposure to pollution of local residents and workers and also an indicator of construction cost savings, given the constraint placed on the crossing of built-up areas, which implies the reformulation of existing roads in detriment of the more expensive option of building a new road. The last two columns in the table give the percentage of road length on land mapped in municipal master plans as areas with agricultural or environmental potential. These two indicators assess the economic and ecological opportunity costs of the new road.

All socially and politically optimal routes have very similar lengths. The socially-optimal route (Ao1) has the lower aggregate severance effects (by definition) but also the lowest proportion of road length crossing all three types of land use. Incremental departures from the socially-optimum towards political-biased distributions (following the patterns in Fig. 2) are associated with longer lengths, greater aggregate severance effects and greater land use costs. The cost in terms of agricultural land is especially noticeable in the projects that use the south middle section (Ap2 and Bp2). The results also suggest that the planned route considers financial cost as the main factor, as this route has the shortest length of all routes and a higher proportion of length in built-up areas. However, this route has the worst indices of all routes in terms of severance effects and negative effects associated with the land use on the areas crossed.

4.3 Distribution

This section presents the distributional impacts of the politically-optimal routes. In a first stage, we study the average severance impact of the routes across their whole length, based on the characteristics of the population affected. In a second stage we look into the profile of the impacts, taking into account the different levels of severance associated with the route. The analysis focuses on a set of 9 variables, including the three political factors and the five socio-economical factors described

Table 4 Averages of political factors, social factor and time gains, weighted by severance effects

	Political factors			Social factors					Time gains
	P1 (Left)	P2 (Political)	P3 (Potent.)	S1 (Age)	S2 (Qualif.)	S3 (Urban)	S4 (Slums)	S5 (Migr.)	
Ao1	0.45	0.03	−0.30	−0.25	−0.49	0.41	0.40	−0.30	0.13
Ao2	0.42	0.07	−0.32	−0.16	−0.45	0.43	0.35	−0.24	0.10
Bo2	0.31	0.24	−0.30	−0.14	−0.28	0.55	0.25	−0.19	0.13
Ap2	0.36	−0.05	−0.23	−0.12	−0.43	0.27	0.33	−0.25	0.04
Bp2	0.26	0.13	−0.22	−0.10	−0.26	0.41	0.23	−0.20	0.08
Plan	−0.01	0.39	−0.20	−0.03	0.10	0.63	0.12	−0.15	−0.13

in the previous section. The ninth variable is an indicator of the benefits that the new road will bring to the population in each district in terms of shorter times to work. This variable is obtained by modelling time to work in the pre- and post-policy scenario, considering data on commuting flows from the census and commuting surveys, which were then disaggregated to give peak and off-peak flows from each enumeration district to a large set of destinations in the Lisbon Metropolitan Area. The estimation of times to work makes use of GIS models of the private and public transport networks and includes the effect of congestion.

Table 4 and Fig. 4 show the distributional impacts of the routes, estimated as the average of several variables weighted by population and the severance effect. The charts illustrate the information in the table according to the sequence of projects obtained when increasing the parameter ε in the specification of the weights placed on the P1 and P2 political factors. The values of all variables are standardized in relation to their mean and standard deviation in the two municipalities involved in the project.

The socially-optimal project (Ao1) is associated with above-average values of the Left (P1), Urbanization (S3) and Slums (S4) factors and below-average values of the electoral potential (P3), Age (S1), Qualifications (S2) and Migration (F5). In other words, a project that minimizes aggregate severance effects has a higher effect on populations that are younger, less-qualified, live in more urbanized areas or in slums, live in the present area for a relatively long time and tend to vote in left-wing parties or to abstain from voting. The severance-weighted average of time gains is also above the regional average, which suggests that the socially-optimal route tends to distribute costs according to benefits.

As we consider higher weights on the P1 (Left) factor, the severance-weighted average of that factor decreases from 0.45 (project Ao1) to 0.26 (project Bp2). However, even in project Bp2, the value is still above the average of the two municipalities. The increase of the distributional weight on P1 does not have a linear relationship with the average of P2 (Political) and only a limited effect on the average of P3 (Potential). However, increasing the weights on P1 decreases the disadvantage of low-qualified individuals and populations living in slums. There is also a slight reduction of the disadvantage of younger individuals.

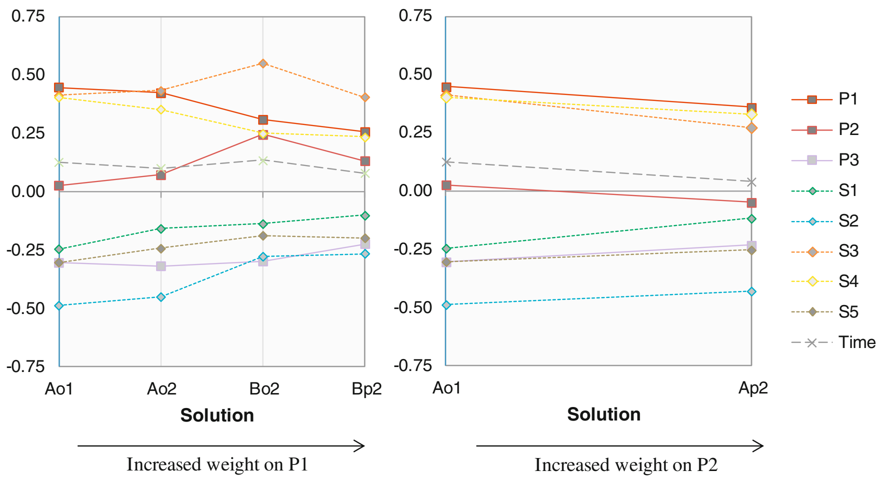

Fig. 4 Averages of political factors, social factors and time gains for increased weight values

Although the consideration of higher weights on the P2 (Political) factor is associated with a change in the optimal route (from Ao1 to Ap2), the effect of that change in the severance-weighted average of that factor is very small (from 0.03 to −0.05). However, the change is linked to patterns of redistribution among social groups that are similar to the previous case, reducing the disadvantages of regions with slum areas and low-qualified and young populations. The change in routes also brings the severance-weighted average of the time gains close to zero, which means that severance costs are distributed more equally among populations deriving different benefits from the road, comparing with the socially optimal route.

The alignment of the planned route is independent of the Left versus Right positioning of the population affected by the project, but affects to a higher degree populations with higher degrees of political mobilization and areas with lower potential for the policy-maker to attract new votes. The socio-economic distributional impacts of planned route are in general lower than the politically-optimal routes, with the exception of the impact falling on urbanized areas (S3).

Figure 5 illustrates with more detail the distribution of the severance effects of the different routes according to the socio-economic characteristics of the population, focusing on the Age and Qualifications factors. The charts plot the average value of the factors for each value of the severance effect. The left and right charts include respectively the projects associated with different values for the weights placed on the P1 and P2 factors.

In the case of the distribution of costs according to age groups, the results show that the effects of the projects associated with higher weights on either political factor is to move the distributional curve closer to the origin, especially in the case of the districts with the highest severance effects (above 0.35). The effects of project Ap2 (obtained placing weights on the P2 factor) are similar to those of project Ao2 (obtained placing weights on P1), showing that attending to different

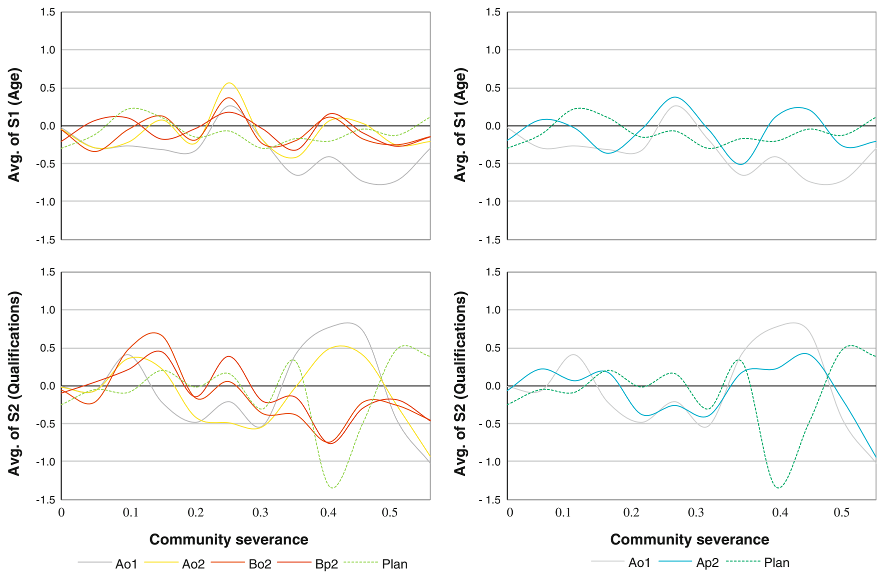

Fig. 5 Severance effects of politically optimal projects: Socio-economic profile

political interests produces the same distributional result. The charts also confirm that the planned route is distributionally neutral in terms of age groups.

In the case of the distribution of costs according to qualification groups, the figure shows that the average values presented in Table 4 mask some of the variation in the distribution of impacts of different degrees. The most important differences between projects regard the intervals with the highest impacts (above 0.35). This interval corresponds to the impacts on the neighbourhoods in the densely-populated eastern end of the route. Options *A* in this end redistribute the impacts among qualification groups differently from options *B* and the planned route. An increase in the weights of the P2 factor or a slight increase in the weights of the P1 factor has therefore a small effect on the qualifications profile of the route, as these increases do not imply a shift from "A" to "B" projects. However, a higher increase of the weights of the P1 factor lead to substantial changes, due to the shift to "B" projects.

The results of this section show that the introduction of political bias in the planning of a new road may contribute to a redistribution of the severance costs of the road among different groups in society, comparing with the socially-optimal route. This is explained in part because the political characteristics of the population are related to social factors, as shown in Table 2. However, the redistributive effect is observed equally for social factors with strong and weak relationships with political factors. For example, while the Left factor is related strongly with the Qualifications factor and only mildly with the Age, Slums and Migration factors, the redistribution impacts of the projects based on weights on the Left factor is observed for all the four social factors.

On the other hand, a given socio-economic distributional impact may be the result of different political strategies of the policy-makers. In this case, even though the factors measuring left wing voters, levels of political participation and political gain are largely independent by definition (as they were obtained by factor analysis), they lead to similar patterns in the redistribution of severance across different groups in society.

5 Conclusions and Further Work

This chapter examined the influence of political factors in the design of route alignments for a new road in an urban area, focusing on the little researched aspect of community severance impacts. The analysis used GIS methods to derive alignments based on the distribution of those impacts across populations with different political characteristics.

The findings add evidence to the study of trade-offs between efficiency and equity in public policy, by providing insights on the role of political factors in the choices over those trade-offs. The analysis showed that the main effect of political bias is at the level of efficiency, as higher levels of political bias are linked to increased deviations from the efficient route, not only in terms of aggregate severance effects but also in terms of land use costs. On the other hand, political bias lead to a more equal distribution of the costs of the project comparing with the efficient route.

The chapter also provides a basis for further exploration of the policy maker's motivations. The process leading to decisions on transport infrastructure is characterized by interactions between different levels of policy-making. Protests to decisions of national governments also tend to be lead by local leaders and as such the assessment of the political characteristics of local populations could include information on whether central and local governments are hold by different parties. The distribution of the time gains brought by the new road to different neighbourhoods, which were in this chapter treated as an indicator of the effects of politically-biased policies, may also be regarded as a factor influencing political decisions, due to its influence on voting behaviour (Hårsman and Quigley 2010).

The analysis of political influences on infrastructure planning tends to be constrained by the spatial scale at which electoral data is released, as electoral districts are usually larger than the scale of community severance and other environmental effects. In this chapter we assumed that the relationships of political and socio-economic variables found at the level of the civil parish also apply at a smaller scale. However, civil parish borders do not necessarily correspond to discontinuities in the spatial distribution of different types of voters. In addition, while we used socio-economic data to predict electoral behaviour in small areal units, aspects such as the communities' political power may also be contained within the residuals of the models—what Hamilton (1995) calls the "pure politics" factor. Further developments in the estimation of spatially disaggregated distributions of political variables can therefore improve the analysis of political bias in transport policies with effects across different neighbourhoods.

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