Perceptions of Equity: A stated Preference Experiment

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Extended Abstract

Infrastructure investments have been the subject of a long lasting debate on their ability to potentiate development on a regional level and increase the economic activity at the areas of influence. The merits of transport infrastructure allocation necessitates the consideration of measures that evaluate aspects of equal opportunities and in general equity, during their allocation. From a social perspective, equity corresponds to human beliefs on justice and fairness [Leventhal, 1980] and as a consequence, it increases social cohesion by provide equal opportunities for increasing welfare. In transportation research, the notion that equity should be taken into account in the planning and policy-making process has been strengthened the last few years, as it has been found to govern the distribution of a number of wide effects [Thomopoulos and Grant-Muller, 2013]. Additionally, the consideration of equity has been widely included in a number of policies on a European or national level [Thomopoulos et al., 2009].

The methodological framework of evaluating equity in transportation planning and policy has been shaped on indicators for assessing the equity of transportation infrastructure allocation, estimated by Spatial Impact Models (SIM), Lorenz curves, Gini coefficients, density values [Bröcker et al., 2010, Delbosc and Currie, 2011] as for also simpler approaches that include variance, mean absolute deviation, sum of absolute deviations, range or variance of logs [Marsh and Schilling, 1994]. IIn some cases, the estimation of equity is incorporated in Cost-Benefit Analysis (CBA) and Multi-Criteria Analysis (MCA), used to appraise the allocation of infrastructure investments. A significant gap in the literature of equity is found the evaluation of how people perceive equity and what is the relative importance that they attribute to it. This aspect of equity has the potential to provide a better understanding on what is perceived as beneficial investments from the public, and introduce concepts of willingness to pay for equity.

To the best of the authors knowledge, this is the first effort in transportation research to explore aspects of equity perception. In this study we design and perform a stated preference experiment. The questionnaire designed consists of three parts. The first part is related to socio-demographics characteristic of individuals (such as gender, age, occupation) and some basic transport-related questions (such as mode of transport and car ownership). The second part includes the Stated Preference scenarios, that is expressed as the choice to fund (or not) one out of two projects (Alternatives: Project 1, Project 2, Do Not Fund any Project), which would induce equity in their cities. The attributes used are presented in Table 1.

Table 1: Survey Attributes

Attribute	Levels	Units
Personal Daily Travel Cost	(0, 1.5, 3)	Euro
Personal Travel Time Change	(-0.2, 0, 0.2)	Percentile Travel Time Change
Percentage of Population Benefiting	(0, 0.15, 0.3)	Percentage
Overall Congestion Reduction	(0, 0.15, 0.30)	Percentage of Reduction

The full factorial design yielded more that 6000 scenarios which were reduced by the use of an optimal factorial survey design (choiceDes package) and by removing choice scenarios with obviously dominant alternatives. This resulted in 64 choice scenarios which were distributed in 8 blocks, so that each respondent would have to only answer 8 scenarios. An example of the scenarios is presented in Figure 1.

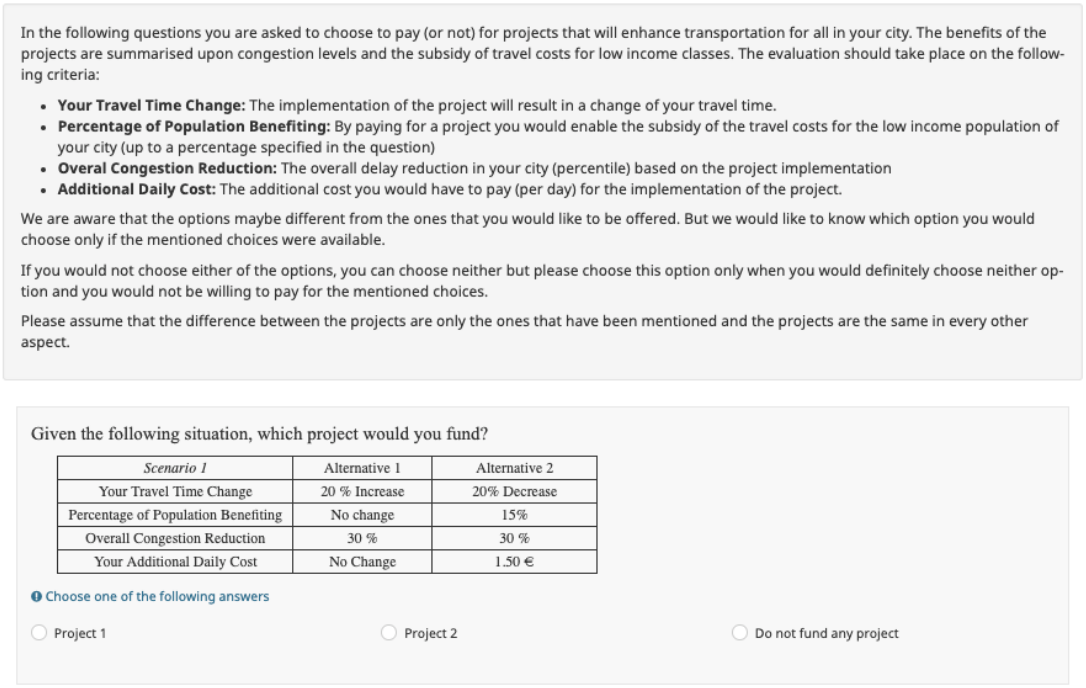

Figure 1: Example of Choice Scenarios Presented to Individuals

The third part included questions related to perception of equity. These were mainly likert scale questions, which evaluated how strongly respondents agree or disagree with equity related statements such as " Everybody should equally pay for road infrastructure and parking costs. " or " Low-income people should receive discounts for road and parking fees.". The intention of this section was to provide some basis for the definition of one or more latent variables.

The questionnaire was distributed in various online channels such as Facebook and Instagram resulting in 853 responses out of which the 580 were complete. After data processing and cleaning, discrete choice models have been estimated. Even in its simplest case, of Multinomial Logit Model (intermediate model presented in Table 2) the results can be considered interesting: equity related attribute receive positive signs, indicating that people perceive equitable systems beneficial. Given the lack of similar models in the literature, a comparison cannot be performed, however, it seems that the results of the model (in terms of signs and magnitude) are plausible and that they could be useful to evaluate choices for equity.

In the months to come the application of more advanced model structures will be performed, with the introduction of panel effect and the complete set of influencing socio-demographics. It is believed that this would create a stepping stone for the exploration of how people perceive

equity in such a way that would allow better allocation of resources based on actual choices of individuals.

Table 2: Intermediate Model Estimation

Variable (and interactions)	Estimate	Std. Error	$z - value$	$Pr(>\|z\|)$	
Do Not Fund (intercept)	-2.077	0.9097	-2.284	0.0224	*
Daily Travel Cost	-0.515	0.0372	-13.850	< 2.2e-16	***
Congestion Reduction	3.311	0.2864	11.563	< 2.2e-16	***
People Benefiting	3.448	0.3172	10.869	< 2.2e-16	***
Delay Of Travel	-4.320	0.2655	-16.275	< 2.2e-16	***
Do Not Fund - Household size of 1	0.898	0.2829	3.174	0.0015	**
Do Not Fund - Household size of 2	0.666	0.2962	2.247	0.0246	*
Do Not Fund - Household size of 3	0.613	0.3172	1.933	0.0533	.
Do Not Fund - No answer Household size	1.009	0.5954	1.694	0.0902	.
Do not fund - Ownership of Private Car	0.456	0.1685	2.705	0.0068	**
Do not fund - Income Level 10,000-20,000	-0.600	0.3639	-1.649	0.0992	.
Do not fund - IncomeLevel 30,000-40,000	-1.767	0.4807	-3.676	0.0002	***
Do not fund - IncomeLevel 50,000-60000	-0.931	0.4161	-2.238	0.0252	*

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Number of Observations: 4640 $(580 \cdot 8)$
Log-Likelihood: -1936.4
McFadden $R\hat{2}$: 0.13854
*Note: Signif. codes: 0 *** 0.001 ** 0.01 * 0.05 . 0.1 1*

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