An empirical assessment of Dutch citizens' preferences for spatial equality in the context of a national transport investment plan

Mouter, Niek; van Cranenburgh, Sander; van Wee, Bert

Important note
To cite this publication, please use the final published version (if applicable).
Please check the document version above.

An empirical assessment of Dutch citizens' preferences for spatial equality in the context of a national transport investment plan

Abstract

This study presents empirical insights into Dutch citizens' preferences for spatial equality in the context of decision-making regarding the composition of a national transport investment plan. To the best of our knowledge, our study is the first study worldwide which empirically investigates citizens' preferences for the spatial distribution of benefits accruing from a transport investment plan. We conducted two Stated Choice experiments: one involving an investment plan for travel time savings, the other involving an investment plan for traffic safety. Our results show that in the context of travel time savings, a vast majority of citizens has a strong preference for spatial equality. When the investment program involves traffic safety improvements, the share of citizens that has a preference for spatial equality is considerably smaller. Specifically, using a Latent class discrete choice analysis we identified distinct segments. The first segment has a very strong preference for the investment program having the largest total reduction in traffic deaths; the second segment assigns a substantial value to an equal distribution of reductions of traffic deaths across the Netherlands. Highly educated citizens are found to have a relatively strong preference for spatial equality as compared to low educated citizens. Contrary to our expectations, explanatory variables such as political orientation, income, car ownership and region of residence do not appear to associate with citizens' preferences for spatial equality.

1. Introduction

The main criteria to evaluate transport policies and transport infrastructure projects concern efficiency and equity (Rietveld et al., 2007). In virtually all western countries Cost-Benefit Analysis (CBA) is used to evaluate the efficiency of large transport projects (e.g. Mackie et al., 2014). CBA is also a popular research topic in transport literature. For instance, there are several contributions that present a CBA of an (innovative) transport project (e.g. Cardell 1980; Nguyen-Hoang and Yeung, 2010; Rotaris et al., 2010; Saelensminde, 2004). Moreover, the literature examines substantive problems and improvements of the CBA (e.g. Grahem, 2007; Mouter et al., 2013a) and several researchers have investigated the relation between CBA and political decisions (e.g. Annema et al., 2017; Eliasson et al., 2015; Nellthorp and Mackie, 2000; Mouter, 2016; Nyborg, 1998; Odeck, 1996, 2010; Sager and Ravlum, 2005). Cost-Benefit Analysis is often criticized in the academic literature for ignoring equity and other ethically important implications of policies (e.g. van Wee, 2012). Hence, over the past decades, transport researchers and policy makers have devoted increasing attention to questions about operationalizing and evaluating justice and equity aspects of transport policies (Pereira et al., 2016). For instance, some researchers have explored the question what justice means in the context of transportation planning (e.g. Martens 2016; Pereia et al., 2016). Moreover, several scholars explore ways to include equity in the planning and evaluation of transport policies, for instance, through reviewing how (different) justice principles can be used to integrate equity concerns in the evaluation and planning of transport programs and projects (e.g. Brodie, 2015; Golub and Martens, 2014; Karner and Niemeier, 2013; Khisty, 1996; Martens et al. 2012; Rietveld et al., 2007; Thomopoulos et al., 2009; van Wee and Roeser, 2013). Equity analysis is however complex because there are several types of equity, various ways to categorize people for equity analysis, numerous impacts to consider, and various ways of measuring these impacts (van Wee and Geurs, 2011). For instance, Thomopoulos et al. (2009) provide an overview of eleven equity categories that could matter in ex ante evaluation of transport projects. Hence, the question arises which of these equity categories are the most important ones in the evaluation of transport projects. Several contributions in the existing literature identify 'accessibility' as the focal variable in the analysis of equity of transport systems arguing that a transport system is fair when accessibility levels do not differ too strongly across population groups (distinguished by, for instance, income category, race or mode availability), or when those who are worse of have at least a minimum level of accessibility to key destinations (e.g. Lucas et al., 2016; Martens et al., 2012; Martens 2016; Pereia et al., 2016). For instance, Martens (2016, p. 125) concludes that a transportation system is fair, if persons struck by various forms of accessibility-related brute bad luck (e.g. travel-related impairments) are provided with a sufficient level of accessibility. Since accessibility can be defined and operationalized in many ways and has taken on a variety of meanings, various studies aspire to develop and apply adequate accessibility indicators or explore what type of accessibility indicators are suitable for an equity analysis in the field of transportation (e.g. Brodie, 2015; Martens and Golub, 2012; Lucas et al, 2016; Neutens et al., 2010; van Wee and Geurs, 2011).

Interestingly, despite the emerging consensus among researchers that accessibility is the most promising focal variable of distributive justice (e.g. Brodie, 2015; Martens, 2016; Pereira et al., 2016), studies investigating political decision-making regarding transport

projects established that politicians particularly regard 'spatial equality' of transport investments as a key consideration in their decisions involving the allocation of investments in a national transport program for infrastructure investments (e.g. Mouter, 2016; Fridstrøm and Elvik, 1997; Sager, 2016; van der Hoeven, 2015). For instance, Dutch politicians argue that it is fair to balance transport investments across the country to some extent, because all over the country Dutch citizens pay taxes which makes it justifiable to improve citizens' mobility all over the country (Mouter, 2016). Recently, the spatial fairness of the Dutch National Program for Transport Investment (MIRT) was disputed as a result of the conclusion of a Dutch study (BNR, 2016a) that 80% of infrastructure investments in the period 2010-2015 were located in the Randstad (urbanized region in the west of the Netherlands). For instance, Dutch Member of Parliament Martijn van Helvert considered this distribution to be unfair, arguing that 42% of Dutch citizens live outside the Randstad and 47% of the Dutch GDP is earned outside the Randstad (BNR, 2016b). According to van Helvert, the ratio 80%-20% of transport investments versus the ratio 53%-47% GDP earned is clearly out of balance.

Although there are several studies which establish that politicians prefer that transport investments are equally distributed across the country to some extent, to the best of our knowledge, no empirical study exists which elicits citizens' preferences regarding spatial equality of transport investments. The purpose of our study is ameliorating this gap in the scientific literature by generating empirical insights on Dutch citizens' preferences for spatial equality in the context of a national transport infrastructure investment plan through carrying out two stated choice experiments.

We survey Dutch citizens' preferences for spatial equality in the context of an investment program which decreases travel times (Experiment 1) and an investment program improving safety (Experiment 2). We decided to investigate citizens' preferences for spatial equality regarding these two effects because travel time savings and safety benefits are regarded as central elements in the evaluation of transport schemes with a CBA (e.g. Bahamonde-Birke et al., 2015; Mackie et al., 2001). For instance, Mackie et al. (2001) note that travel time savings have accounted for around 80% of the monetized benefits within a CBA. Because our study focuses on two effects we regard our study as an important first empirical exploration of citizens' preferences for spatial equality in the context of a transport investment plan. Further research may study such preferences for other effects.

In our study, we also analyze whether the proportion of citizens who assign value to spatial equality differs when the investment program involves decreasing travel times or improving safety. Finally, we investigate whether preferences for spatial equality differ between categories of people in the Dutch population. To do so, we employ Latent class discrete choice models. Since in the Netherlands particularly politicians representing political parties with a relatively large voter base in the relatively sparsely populated areas (e.g. the Christian parties) convey the spatial equality argument (Mouter, 2016), we hypothesize that Dutch citizens who vote for these parties and/or live in the relatively sparsely populated areas have a relatively strong preference for spatial equality.

We contend that our study can be a valuable addition to the literature on equity of transport systems which primarily focuses on fair distributions of accessibility levels. Our investigation of citizen preferences regarding spatial equality of transport investments can

contribute to the systematic inclusion of equity concerns in the design and evaluation of transport policy options.

This paper proceeds as follows: section 2 discusses the conceptualization and operationalization of the experiments. Section 3 discusses the data collection. Section 4 presents the results and, finally, section 5 provides conclusions and discussion.

2. Conceptualization and operationalization of the experiments

We selected Stated Choice (SC) as a methodology to infer citizens' preferences concerning spatial equality since SC is currently the dominant empirical approach to derive measures that are used in the evaluation of transport projects, such as the Value of Time and the Value of a Statistical Life (e.g. Börjesson and Eliasson, 2014; Hensher et al., 2009; Kouwenhoven et al., 2014; Ojeda-Cabral et al., 2016). We also used studies in experimental economics which investigate individuals' preferences for equality as inspiration for the design of our SC-experiments. For instance, Andreoni and Miller (2002) employed a modified version of a dictator game and found that respondents follow preferences ranging from perfectly selfish, to utilitarian (maximizing total benefits for participants), to egalitarian (minimizing inequality between pay-offs received by participants in the experiment). Stahl and Haruvy (2009) argue that the results of their extensive-form games – in which participants are enabled to respond to each other's actions – are best reconciled with a behavioral model that incorporates self-interest, efficiency and inequality aversion. Since studies in experimental economics identify 'self-interest' and 'efficiency' as important other motivations in experiments in which individuals' preferences for equality are analyzed, we constructed several SC experiments in which respondents are asked to choose between transport policies/projects which differ in terms of; 1) efficiency: total benefits for Dutch citizens (travel time savings or safety improvements); 2) spatial equality: the extent to which the benefits accruing from the transport policy/project were distributed in an equal way across regions; 3) self-interest: total benefits in the region where the respondent lives/travels most kilometers.

2.1 Pilot surveys

Given that little guidance is available in the literature concerning empirically measuring citizens' preferences for spatial equality of transport policies we performed an extensive pretesting of these SC experiments which involved several rounds of pilot surveys in which respondents were interviewed about their understanding and perception of alternative experiments, and were explicitly asked if particular experiments were realistic, intelligible and meaningful. Below, we address how we translated insights from the pilot surveys into five design objectives for the experiments.

Firstly, we decided to study Dutch citizens' preferences for spatial equality in their evaluation of the spatial distribution of benefits accruing from a (large) transport investment program as a whole instead of their preferences for the spatial distribution of effects accruing from specific transport projects within a transport investment program. The key reason for this decision was that respondents were predominantly concerned about spatial equality in their assessment of the composition of the national transport program as a whole.

Secondly, we decided to design SC experiments in which the extent to which benefits from a transport investment plan are distributed in an equal way between the Randstad and the

rest of the Netherlands differs between choice alternatives, since the political discussion in the Netherlands specifically focuses on the question whether transport investments are fairly distributed between the relatively sparsely populated parts of the Netherlands (North, East and South of the country) and the densely populated Randstad (e.g. Mouter, 2016). Moreover, respondents participating in the pilot surveys indicated that the intelligibility of the choice tasks increased when the number of people living in both regions did not vary substantially between the two regions. This was the most important reason to also include the province of Flevoland – which is not a densely populated province – in the urbanized Randstad region.[1] Figure 1 illustrates which areas of the Netherlands are allotted to Region A and Region B.
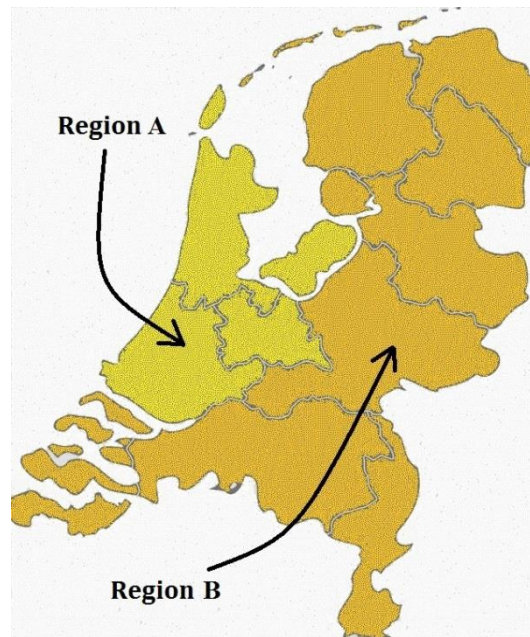
FIGURE 1: Demarcation Region A and Region B

Thirdly, we designed SC experiments in which respondents were presented with three investment alternatives and were asked to recommend one of these alternatives to the government. From the interviews we conducted after the pilot surveys we inferred that many respondents indeed take the 'aggregate benefits for the Netherlands', 'distribution of benefits between regions' and 'benefits in their own region' into account when making their choices. For respondents it was easier to make a trade-off between these three motivations in SC experiments with three alternatives than in the binary SC experiments we tested, since in binary experiments it was unavoidable that one of the two choice alternatives outperformed the other choice alternative on two criteria.[2]

---

1 In August 2016 8,119,787 Dutch citizens live in Region A and 9,314,130 Dutch citizens live in Region B, (CBS statline, October 2016). Another argument to classify this province in the urbanized Randstad region is that the two largest cities of Flevoland (Almere and Lelystad) are seen as commuter towns in which many people live who work in Amsterdam.

2 We also considered to present respondents with four alternatives in each choice situation (one performing best on aggregate benefits for the Netherlands, one performing best on spatial equality, one performing best on benefits for Region A and one performing best on benefits for Region B). However, we believed it was too demanding for respondents to choose between four choice alternatives.

Fourthly, we decided to include choice situations in our experiments in which two choice alternatives score best on one attribute (e.g. 'aggregate benefits for the Netherlands'). An observation from the pilot surveys was that a group of respondents always chose for the alternative with the highest aggregate benefits for the Netherlands and another group of respondents always chose for the alternative with the most equal distribution of benefits between regions in the Netherlands. Including choice situations in our experiment in which two choice alternatives score best on 'aggregate benefits for the Netherlands' allows us to infer whether respondents who consider 'aggregate benefits for the Netherlands' to be the most important criterion prefer an alternative with 'a more equal distribution of benefits across the country' or an alternative with 'the most benefits accruing to the region in which they live/travel most kilometers' provided that alternatives score equally on 'aggregate benefits for the Netherlands'.

Fifthly, we included choice situations in our experiments in which two alternatives scored almost equally well on one attribute (e.g. 'aggregate benefits for the Netherlands'), but the second best alternative on this attribute scored substantially better on another attribute (e.g. 'spatial equality'). In the pilot surveys a relatively large share of respondents was potentially non-trading on one of the attributes. Opting for this relatively complex design objective allowed us to maximize the possibility of observing trading behavior, even when respondents have a very high marginal utility for one particular attribute.

2.2 Experiments

To elicit preferences for spatial equality, we use two choice contexts: 1) an investment program which decreases travel times (Experiment 1), and 2) an investment program improving safety (Experiment 2). Experiment 1 and 2 are very similar in terms of the design: the only difference is the choice context.

In Experiment 1, respondents were asked to choose between investment alternatives that differ in terms of the total travel time savings for Dutch citizens accruing from the investment program, and the extent to which the travel time savings accruing from the investment program are distributed in an equal way across two regions (Region A and Region B). Note that we used 'difference from the mean' to conceptualize 'the extent to which travel time savings are equally distributed'. More specifically, when in choice alternative X the average inhabitant of Region A saves 12 minutes travel time and the average inhabitant of Region B saves 2 minutes the 'difference from the mean' is 5 minutes. When in choice alternative Y this distribution is 7 minutes versus 5 minutes (difference from the mean = 1 minute), alternative Y is superior on 'spatial equality', since the difference from the mean is smaller than in alternative X. Figure 2 (in section 4) shows an example of a choice task in Experiment 1.

In Experiment 2 respondents are asked to choose between three investment programs which differ from one another in terms of the total number of traffic deaths saved (as opposed to travel time savings) and the distribution of reductions in traffic deaths between Region A and Region B. Figure 3 (in section 4) shows an example of a choice task in Experiment 2.

To identify candidate attributes for the choice experiments we carried out a new round of pilot surveys. The attributes were selected based on the model results of the pilot surveys and the feedback received from the participants in the pilot surveys. For instance, based on the

comments of the participants in the pilot surveys we decided to use '12 minutes travel time savings for the average inhabitant' as the maximum attribute level in the choice alternatives presented to the respondents in Experiment 1. Respondents negatively assessed the realism of choice alternatives which would result in even larger travel time savings.

Given the complexity of our design requirements, we were not able to generate an efficient design. Moreover, we were not able to generate and orthogonal design which consisted of realistic choice situations according to respondents participating in the pilot survey and, at the same time, corresponds with our design requirements. Realism of choice situations is generally regarded as an important feature of good quality stated choice experiments (e.g. Johnston et al., forthcoming; Rose and Bliemer, 2009), but we deemed the realism of our experiments to be particularly important because choice tasks that were not perceived as realistic representations of trade-offs that the Dutch government needs to make were evaluated in a very negative way by respondents participating in the pilot surveys. Hence, we created our design using a heuristic approach. That is, we tested a wide array of choice tasks in the pilot surveys and selected the choice tasks that respondents participating in the pilot surveys regarded as realistic trade-offs that the government needs to make. From these choice tasks we selected six choice situations that were needed to meet the fourth and the fifth design objectives of our experiments. To avoid the issues with non-traders that were present in the pilot surveys, we included four choice tasks in the experiments that were considered by respondents participating in the pilot surveys to be 'tipping-point' choice tasks. With a tipping-point choice task we mean a choice task in which several respondents make a different choice when compared with the choices they made in the other choice tasks. Choice task 8 in Experiment 1 (see the appendix) is an example of a tipping-point choice task. In the pilot surveys many respondents selected the choice option superior on 'aggregate travel time savings for Dutch inhabitants' in this choice task although they selected the choice option superior on 'spatial equality' in all the other choice tasks. The appeal of using a heuristic design (instead of an orthogonal or efficient design) is that it is easier to adapt the experimental design to respondents' feedback. However, due to our choice to opt for a heuristic design we may expect somewhat larger standard errors, than in case we would be able to use an efficient (or orthogonal) design.

To increase the probability that respondents reflect their true preferences in the experiments we designed so-called consequential experiments. Consequentiality implies that respondents believe that their choices in a survey might have consequences in real life, for instance, by influencing the agency's final decision (Carson and Groves, 2007). Several studies (e.g. Landra and List, 2007; Vossler and Evans, 2009) find that hypothetical bias disappears in their experiment when the stated preference elicitation method makes participants feel that their answers are more consequential. Zawojska and Czajkowski (2015) recently established in a meta-analysis that if only the consequential studies are considered no significant discrepancy between stated and true values exist. To ensure the consequentiality of our experiment, we emphasized in the text that the government considers to use the results of the experiment in their decisions concerning investments in transport projects. We deem this to be defendable as the financier of our research (the province of Limburg) specified that they

intended to consider the results of the experiment in their policies in their decision to fund the research.[3]

Finally, note that the experiments which are completed by respondents in this study are designed in a so-called "citizen context" rather than the more conventional "consumer context". Mouter and Chorus (2016) establish that the key distinction between citizen preferences and consumer preferences is that they involve individual preferences inferred from choices within different budget constraints. Namely, while consumer preferences involve an individual's preferences within his/her personal budget constraint (after tax income), citizen preferences involve an individual's preferences regarding the allocation of the government's budget.

3. Data Collection

The questionnaire consisted out of two major sections. Firstly, after reading through an introductory text, respondents were asked to complete the ten choice situations. To prevent ordering effects, the choice situations were presented in random order across respondents. Since the text preceding the choice tasks is of key importance for our study, we choose to repeat it for every choice task, to enable respondents to re-read it. In the second part of the questionnaire, we asked respondents questions about their political orientation, preferred mode of travel and about the location in the Netherlands where they live and the region in which they travelled most kilometers in the last year. Moreover, we asked the respondents what the most (un)important criterion was by the choices they made in the first part of the questionnaire.

A survey company (TNS NIPO) was asked to draw two random samples of Dutch citizens of 18 years and older. We did not necessarily ask the survey company to draw a representative sample for this group of Dutch citizens, but it was important that all segments in terms of age, education and income were represented and since we aspired to compare the results of Experiment 1 and Experiment 2 it was also important that the socio-demographic characteristics did not differ substantially between the two samples. Finally, we asked the survey company to sample 50% of the respondents in Region A and 50% of the respondents in Region B, since we also aspired to analyze the extent to which citizens living in these regions have different preferences concerning spatial equality.

In the period March 8-March 13 2016 the survey company recruited 174 respondents for Experiment 1 and 165 respondents for Experiment 2. The survey company provided us with additional information about the socio-demographic characteristics of each respondent (e.g. gender, age, income, car ownership and education). This data and the data gathered in the second part of the questionnaire allows us to investigate whether preferences for spatial equality differ between categories of people in the Dutch population. Table 1 presents the social-demographic characteristics and political orientation of the respondents.

---

[3] Note that the financier did not specify how they intended to use the results of our study.

TABLE 1 Socio-demographics and political orientation

Variable	Experiment 1		Experiment 2	
	Reg. A	Reg. B	Reg. A	Reg. B
	88	86	77	88
Gender				
Female	44	43	37	47
Male	44	43	40	41
Age				
18 to 29 yr.	6	3	6	4
30 to 39 yr.	18	6	9	10
40 to 49 yr.	13	23	14	20
50 to 59 yr.	20	27	17	28
60 to 69 yr.	18	20	20	19
70+ yr.	13	7	11	7
Completed education				
Elementary school	3	7	3	9
Lower education	12	16	15	14
Higher education	37	36	35	37
University education	36	27	24	28
Household gross income				
$I < 12\ 900$	4	1	5	3
$12\ 900 \leq I < 27\ 000$	12	17	10	11
$27\ 000 \leq I < 40\ 000$	14	12	14	24
$40\ 000 \leq I < 67\ 000$	25	24	22	26
$67\ 000 \leq I < 79\ 900$	7	11	7	6
$I \geq 79\ 900$	26	21	19	17
For which political party did you vote?				
VVD (Liberal-rightwing)	18	6	15	7
PVDA (Labor)	6	7	8	11
CDA (Christian-Democrats)	5	8	2	8
PVV (Nationalists)	4	10	7	9
GroenLinks (Greenparty)	9	2	6	5
SP (Socialists)	7	14	7	7
D66 (Social-Liberals)	10	11	6	7
Smaller Christian Parties	3	5	6	5
Party for the Animals	1	1	1	2
Other Political Parties	4	2	3	1
I didn't vote	5	8	10	14
I don't want to answer this question	16	12	6	12

4. Results

4.1 Descriptive results

To illustrate the choices respondents made in the experiments in a descriptive way, we present for one choice task of Experiments 1 and 2 respectively the number of respondents choosing for each of the three possible choice alternatives (Figures 2 and 3). The same data for all the ten choice tasks can be found in Appendix A.

Figure 2 presents the number of respondents choosing in one choice task for Alternative 1 (superior on 'spatial equality'), Alternative 2 (superior on 'travel time savings for the average inhabitant of Region A') and Alternative 3 (superior on 'aggregate travel time savings for Dutch inhabitants' and 'travel time savings for the average inhabitant of Region B').

There are multiple locations in the Netherlands where the Government can reduce travel times by investing in transport infrastructure.

The government has decided to start an investment program which reduces travel times for Dutch citizens.

The government now has to make a decision regarding the composition of the investment program.

You now receive 10 questions in which we present 3 alternatives of the investment program and ask you which alternative you advise to the government.

You can assume the following:

- The alternatives of the investment program consist out of a large package of transport projects (rail and road)
- The alternatives of the investment program only differ in terms of travel time savings accruing to individuals living in **Region A** (provinces of Zuid-Holland, Noord-Holland, Flevoland and Utrecht and **Region B** (Zeeland, Noord-Brabant, Limburg, Gelderland, Overijssel, Drenthe, Groningen, Friesland);
- Costs of the alternatives of the investment program are equal and the alternatives have the same effects on the environment and traffic safety;
- Regions A and B are inhabited by an equal number of Dutch citizens (around 8.5 million);

Below you find the travel time savings for the average inhabitants of Regions A and B accruing from the alternatives of the investment program.

Which alternative of the investment program would you recommend to the government?

	Alternative 1	Alternative 2	Alternative 3
Travel time savings for the average inhabitant of **Region A**	5 minutes per day	8 minutes per day	1 minute per day
Travel time savings for the average inhabitant of **Region B**	5 minutes per day	1 minute per day	10 minutes per day
Number of respondents choosing Alternative	109 (63%)	32 (18%)	33 (19%)

FIGURE 2: Number of respondents choosing Alternatives 1, 2 and 3 in one choice task of Experiment 1.

Firstly, Figure 2 shows that most respondents recommended the investment program which is superior on 'spatial equality' (Alternative 1) indicating that a substantial number of respondents participating in Experiment 1 have a clear preference for spatial equality.

Figure 3 depicts one choice task of Experiment 2. Figure 3 also presents the number of respondents choosing for Alternative 1 (superior on 'traffic deaths saved in Region A'), Alternative 2 (superior on 'aggregate traffic deaths saved in the Netherlands' and 'traffic deaths saved in Region B') and Alternative 3 (superior on 'spatial equality').

There are multiple locations in the Netherlands where the Government can reduce traffics deaths by investing in transport infrastructure.

The government has decided to start an investment program which reduces the number of traffic deaths in the Netherlands.

The government now has to make a decision regarding the composition of the investment program.

You now receive 10 questions in which we present 3 alternatives of the investment program and ask you which alternative you advise to the government.

You can assume the following:

- The alternatives of the investment program consist out of a large package of transport projects (rail and road)
- The alternatives of the investment program only differ in terms of traffic deaths saved in **Region A** (provinces of Zuid-Holland, Noord-Holland, Flevoland and Utrecht and **Region B** (Zeeland, Noord-Brabant, Limburg Gelderland, Overijssel, Drenthe, Groningen, Friesland);
- Costs of the alternatives of the investment program are equal and the alternatives have the same effects on the environment and travel time savings;
- Regions A and B are inhabited by an equal number of Dutch citizens (around 8.5 million);

Below you find the number of traffic deaths saved in Regions A and B as a results of the alternatives of the investment program.

Which alternative of the investment program would you recommend to the government?

	Alternative 1	Alternative 2	Alternative 3
Traffic deaths saved per year in Region A	11 per year	5 per year	10 per year
Traffic deaths saved per year in Region B	6 per year	15 per year	8 per year
Number of respondents choosing Alternative	9 (5%)	101 (61%)	55 (33%)

FIGURE 3: Number of respondents choosing Alternatives 1, 2 and 3 in one choice task of Experiment 2.

Firstly, Figure 3 shows that most respondents recommended the investment program which is superior on 'aggregate traffic deaths saved in the Netherlands' and 'traffic deaths saved in Region B' (Alternative 2). One-third of the respondents recommended the Alternative which is superior on 'spatial equality' (Alternative 3). Note that this group is considerably smaller than the group of respondents choosing for the 'equality Alternative' in the choice task of Experiment 1 presented in Figure 2.

After completing the choice tasks respondents were asked what the most important criterion and least important criterion was when making the choices. Table 2 presents the respondents' answers to this question. To illustrate, the third row of Table 2 shows that 22% of the respondents participating in Experiment 1 mentioned 'aggregate travel times saved in the Netherlands' as the most important criterion in their choices, 30% selected 'travel time savings in the Region in which they travel most kilometers' and 48% 'the distribution of travel time savings between Region A and Region B'.

Since we expected a priori that respondents who live in Region B and respondents voting for political parties which have a relatively large voter base in Region B (e.g. Christian parties) have a relatively strong preference for spatial equality, Table 2 also shows the extent to which respondents with different voting behavior in the previous election and respondents living in Region A and Region B answer the question which criterion was most/least important in their choices differently. Finally, Table 2 shows whether respondents with different levels of education answer the questions differently, since a preliminary analysis of respondents' answers revealed interesting differences.

TABLE 2 Most important and least important criterion in choices respondents

Experiment 1	Most important criterion			Least important criterion		
	Aggregate	Own Region	Distribution	Aggregate	Own Region	Distribution
Total sample (174)	22%	30%	48%	31%	41%	28%
Region A (88)	30%	28%	42%	28%	40%	16%
Region B (86)	14%	33%	53%	34%	42%	24%
VVD (Liberal-rightwing) (24)	25%	25%	50%	29%	42%	29%
PVDA (Labor) (13)	31%	23%	46%	38%	31%	31%
CDA (Christian-Democrats) (13)	7%	31%	62%	46%	38%	15%
PVV (Nationalists) (14)	21%	43%	36%	29%	36%	36%
GroenLinks (Greenparty) (11)	36%	9%	55%	27%	55%	18%
SP (Socialists) (21)	33%	29%	38%	29%	38%	33%
D66 (Social-Liberals) (21)	19%	29%	52%	29%	52%	19%
Smaller Christian Parties (8)	13%	38%	50%	13%	50%	38%
Party for the Animals (2)	0%	0%	100%	100%	0%	0%
Other political parties (6)	0%	67%	33%	67%	17%	17%
I didn't vote (13)	7%	54%	38%	31%	31%	38%
No answer (28)	25%	25%	50%	21%	46%	32%
Elementary school (10)	10%	70%	20%	50%	20%	30%
Lower education (28)	18%	43%	39%	32%	32%	36%
Higher education (73)	21%	26%	53%	29%	38%	33%
University education (63)	27%	24%	49%	30%	51%	19%

Experiment 2	Most important criterion			Least important criterion		
	Aggregate	Own Region	Distribution	Aggregate	Own Region	Distribution
Total sample (165)	48%	7%	45%	9%	68%	22%
Region A (77)	51%	8%	42%	8%	74%	18%
Region B (88)	46%	7%	48%	10%	64%	26%
VVD (Liberal-rightwing) (22)	59%	5%	36%	5%	77%	18%
PVDA (Labor) (19)	63%	0%	37%	11%	74%	16%
CDA (Christian-Democrats) (10)	30%	10%	60%	10%	60%	30%
PVV (Nationalists) (16)	38%	25%	38%	13%	44%	44%
GroenLinks (Greenparty) (11)	55%	0%	45%	9%	82%	9%
SP (Socialists) (14)	57%	14%	29%	7%	57%	36%
D66 (Social-Liberals) (13)	46%	8%	46%	8%	69%	23%
Smaller Christian Parties (11)	45%	0%	55%	9%	64%	27%
Party for the Animals (3)	33%	0%	67%	0%	100%	0%
Other political parties (4)	50%	0%	50%	0%	75%	25%
I didn't vote (25)	48%	4%	44%	8%	68%	20%
No answer (18)	28%	11%	61%	17%	72%	17%
Elementary school (12)	66%	8%	25%	8%	50%	42%
Lower education (29)	52%	10%	38%	3%	72%	24%
Higher education (72)	42%	10%	49%	13%	65%	22%
University education (52)	38%	2%	60%	8%	75%	17%

The answers of the respondents presented in Table 2 complement the results presented in Figures 2 and 3, in that many respondents participating in Experiment 1 regard the distribution of transport benefits between Region A and Region B to be the most important criterion in their recommendations and that both 'aggregate' and 'distribution' are highly important criteria in the recommendations of respondents participating in Experiment 2. It is interesting to observe that only 7% of the respondents participating in Experiment 2 stated that 'traffic deaths saved in the Region in which they travel the most kilometers' was the most important criterion in their recommendation and 68% of these respondents stated that this was the least important criterion. The importance of 'benefits in own region' seems to be lower for the respondents participating in Experiment 2 than for the respondents participating in

Experiment 1. Furthermore, Table 2 indicates that relatively many respondents participating in Experiment 1 who voted for the Christian Democrats and respondents who live in Region B select 'the distribution of travel time savings between Region A and Region B' as the most important criterion in their choices, but the differences with respectively respondents who voted for other political parties and respondents living in Region A do not seem to be substantial. Another interesting observation is that relatively many highly educated respondents participating in Experiment 1 and 2 selected 'distribution' as the most important criterion in their choices. A final interesting observation is that we did not find a segment of respondents participating in Experiment 1 (e.g. respondents voting for a particular political party) for which it holds true that the largest share of respondents regarded 'aggregate travel times saved in the Netherlands' as the most important criterion in their choices.

4.2 Latent class analysis

Next, we use Latent class discrete choice models to investigate heterogeneity with respect to respondents' preferences for spatial equality. To identify the optimal model, subsequent models were estimated with 1 to 10 latent classes, see Table 3. Each class comprises of a linear-additive Multinomial Logit (MNL) model. The BIC index – which weighs both model fit and parsimony of the model (i.e. the number of estimated parameters) – indicates that the 9 class and the 8 class models are optimal for respectively Experiment 1 and 2. However, such high numbers of classes are difficult to interpret and are susceptible to overfitting. Moreover, as shown in Figure 4 for both Experiment 1 and 2 the Log-Likelihood does not improve greatly after the 3-class models. As such, we decided to continue with the 3-class models for both Experiment 1 and 2.

TABLE 3 Performance of Latent Class models

Context	Travel time savings					Traffic deaths saved				
No. classes	LL	BIC(LL)	Npar	R^2	Class. Error	LL	BIC(LL)	Npar	R^2	Class. Error
1-Class	-1588	3192	3	0.1701	0.000	-1456	2928	3	0.225	0.000
2-Class	-1297	2630	7	0.407	0.017	-1265	2566	7	0.394	0.035
3-Class	-1179	2415	11	0.488	0.024	-1127	2310	11	0.501	0.047
4-Class	-1138	2353	15	0.543	0.051	-1096	2270	15	0.545	0.057
5-Class	-1117	2332	19	0.567	0.056	-1063	2224	19	0.574	0.056
6-Class	-1099	2317	23	0.590	0.062	-1041	2199	23	0.584	0.074
7-Class	-1087	2312	27	0.616	0.099	-1013	2164	27	0.614	0.057
8-Class	-1076	2313	31	0.634	0.110	-1001	2160	31	0.629	0.090
9-Class	-1070	2320	35	0.652	0.138	-992	2164	35	0.640	0.077
10-Class	-1059	2320	39	0.664	0.126	-985	2169	39	0.650	0.125
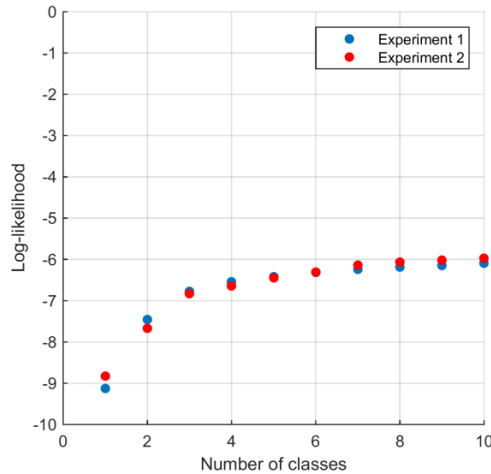
Figure 4: Log-likelihood per observation for 1 to 10 classes

Tables 4 and 5 show the results of the measurement model of respectively Experiment 1 and 2. The Wald statistics and the associated *p*-values indicate that all 3 marginal utilities are significantly different from one another (across classes), in both experiments. The parameter estimates show that there is substantial heterogeneity in respondents' preferences for efficiency, spatial equality and benefits of the transport investment plan in the region where the respondent lives.[4] Furthermore, *t*-values are reported, indicating whether parameters are statistically significantly different from zero. As can be seen, most *t*-values are larger than the critical *t*-value of $t = 1.96$. Based on the estimates we derived marginal rates of substitution[5] between equality and efficiency which are presented in the final row of Tables 4 and 5. Finally, given that we opted for a heuristic design approach, we made sure that all parameters were properly identified. Specifically, we double-checked the correlation matrices to establish that no identification issues occurred during estimation.[6]

Importantly, Table 4 reveals that when the transport benefits involve travel time savings a substantial share of the Dutch citizens (class 1 = 54%) has a strong preference for spatial equality. This group in the Dutch population derives, relatively speaking, a high marginal utility from a relatively more equal distribution of the travel time savings accruing from the investment program across the country. The marginal rate of substitution between 'equality' and 'aggregate' is statistically significantly different from zero for this group of respondents, implying that they are willing to give up aggregate travel time savings for a more equal distribution of travel time savings across Region A and Region B. More specifically, the members of *class 1* are willing to give up 2.3 minutes of aggregate travel time savings for Dutch inhabitants for a 1 minute reduction of the difference between the travel time savings gained in Region A and Region B from the mean travel time savings, but note the relatively

---

[4] Note that we also analyzed respondents' preferences for efficiency, spatial equality and benefits of the transport investment plan accruing to inhabitants of the region where the respondent *travelled most kilometres last year*. Since, 'the region where the respondent lives' and 'the region where the respondent travelled most kilometres last year' were highly correlated using either one of these two conceptualizations of 'self-interest' did not lead to different results. Hence, we decided to only use one of the conceptualizations in the presentation of our results.

[5] Since we use linear-additive MNL models, the marginal rate of substitution is given by the ratio of the parameters. Standard errors are derived using the Delta method (see Daly et al., 2012)

[6] We thank one anonymous reviewer for this useful suggestion.

large standard error.[7] For members of *class 2,* the marginal utility for aggregate travel time savings is not found to be significantly different from zero. As such, members of this class only make trade-offs between the extent to which travel time savings are distributed between Region A and Region B and the travel time savings accruing to inhabitants of the region in which they live. Since for members of *class 2* the marginal utility for travel time savings accruing to inhabitants of the region in which they live is relatively high compared to the members of the other two classes we coin this class as 'Strong Region'. Finally, Members of the smallest class (class 3 = 13%) derive a relatively low marginal utility from the extent to which travel time savings are distributed between Region A and Region B when compared to the members of *class 1* and *class 2*. Since the members of *class 3* derive a comparable marginal utility from the aggregate travel time savings for the Netherlands, distribution of travel time savings across the country and travel time savings for inhabitants of their own region we label members of *class 3* as 'Traders'.

TABLE 4 Results Latent Class analysis Experiment 1

Context	Travel Time savings										
Number of observations	1740										
Number of respondents	174										
Null LL :	-1911.6										
Final LL:	-1167.7										
ρ^2 :	0.39										
Number of parameters	13										

		Class 1 Strong Equality			Class 2: Strong Own Region			Class 3: Traders			Wald	p-val
Class size		54%			33%			13%				
Estimates		Est	SE	t-stat	Est	SE	t-stat	Est	SE	t-stat		
	B_Aggr_1	0.42	0.05	9.39	-0.05	0.05	-1.00	0.25	0.06	4.04	110.1	0.00
	B_OwnR_1	0.10	0.03	3.95	0.60	0.05	12.65	-0.16	0.03	-5.81	211.3	0.00
	B_Equity _1	-0.99	0.06	-16.97	-0.30	0.06	-5.31	-0.10	0.05	-2.01	304.3	0.00
B_Equity/B_Aggregate		-2.33	1.11	-2.11	6.48	6.11	0.98	-0.41	0.70	-0.56		

B_Aggregate = marginal utility of aggregate Travel time savings in Region A and Region B;
B_OwnRegion = marginal utility of Travel time savings accruing to inhabitants in the respondents' region of residence;
B_Equality = marginal utility of unbalance of the distribution of the Travel time savings between Region A and Region B. In this context, unbalance of the distribution is operationalized as the difference from the mean.

---

[7] One of the explanations for the relatively large standard error might be that we used a heuristic design.

TABLE 5 Results Latent Class analysis Experiment 2

Context	Traffic deaths saved
Number of observations	1650
Number of respondents	165
Null LL :	-1812.7
Final LL:	-1120.3
ρ^2 :	0.38
Number of parameters	13

		Class 1 Traders			Class 2 Strong Aggregate			Class 3 Unclear			Wald	p-val
Class size		44%			37%			19%				
Estimates		Est	SE	t-stat	Est	SE	t-stat	Est	SE	t-stat		
	B_Aggr_1	0.43	0.04	10.67	1.51	0.15	9.99	-0.04	0.04	-0.87	256.8	0.00
	B_OwnR_1	0.13	0.02	5.61	0.03	0.01	2.72	0.04	0.01	4.18	63.7	0.00
	B_Equity _1	-0.48	0.04	-11.65	-0.04	0.02	-2.50	0.03	0.02	1.58	166.7	0.00
B_Equity/B_Aggregate		-1.12	0.65	-1.72	-0.03	0.10	0.89	0.75	3.77	-0.20		

B_Aggregate = marginal utility of aggregate Traffic deaths saved in Region A and Region B;
B_OwnRegion = marginal utility of Traffic deaths saved in the respondents' region of residence;
B_Equality = marginal utility of unbalance of the distribution of the Traffic deaths saved between Region A and Region B. In this context, unbalance of the distribution is operationalized as the difference from the mean.

Table 5 reveals that when the transport benefits involve a reduction of traffic deaths a substantial class of Dutch citizens (class 1 = 44%) has a strong preference for spatial equality in the context of an investment program improving safety. This class also assigns a significant value to a reduction of the total traffic deaths saved in the Netherlands and the number of traffic deaths saved in their own region. Hence, we label this class as 'Traders'. Members of *class 2* have a very strong preference for the investment program with the largest aggregate reduction in traffic deaths and these individuals derive a very low marginal utility from a balanced distribution of traffic deaths saved across the two regions. The smallest (class 3 = 19%) is a relatively noisy class. Therefore, we label this class as 'unclear'. Only the number of traffic deaths saved in the region of residence appears to significantly explain the choices of the respondents belonging to this class.

Finally, results show that respondents' choice behaviour is not similar across the two experiments. For instance, class 2 in Experiment 1 constitutes of decision makers that consider 'Aggregate' not to be a relevant attribute and 'Own Region' and 'Equality' to be relevant attributes, whereas in Experiment 2 no such class is identified.

4.2.1 Explaining heterogeneity
A key feature of Latent Class discrete choice models is its membership model. In the membership model observable characteristics of the decision-makers are used to explain membership of a particular class, potentially providing behaviour insights (Hess et al,. 2011). Tables 6 and 7 show the estimation results for the class membership models. Various socio-demographic variables that might explain class membership were investigated (e.g. Age, Income, Education, Car ownership, Preferred mode of travel and Gender) alongside with two variables from which we a priori expected that they would explain class membership: Region

of residence (A or B) and Political orientation. However, somewhat surprisingly, only 'Education' was found to explain class membership in both Experiment 1 and 2. The other variables were found highly insignificant in explaining class membership.[8]

Specifically, in both Experiment 1 and 2 high level of education is positively associated with a particular class this being *class 1*. In both experiments respondents belonging to *class 1* are characterized by having a strong and significant preference for a more equal distribution of travel time savings/reduction in traffic deaths across Region A and Region B when compared to respondents belonging to the other two classes. Moreover, in both experiments *class 3* is associated with low levels of education and respondents belonging to this class derive a relatively low (and for Experiment 2 a statistically insignificant) marginal utility from an equal distribution of benefits of the transport investment program. In sum, the class membership model reveals that when Dutch citizens are high (low) educated they have a high (low) probability of belonging in *class 1* which is associated with a relatively strong preference for spatial equality. Likewise, when Dutch citizens are low (high) educated they have a high (low) probability of belonging in *class 3* which is associated with a relatively low preference for spatial equality.

TABLE 6 Class membership model Experiment 1

Context: Travel Time savings	Class1		Class2		Class3		Wald	p-value
	Est	t-stat	Est	t-stat	Est	t-stat		
Intercept	-0.97	-2.28	-0.49	-1.21	1.46	2.84	8.39	0.02
Covariates								
Education	0.32	3.96	0.15	1.87	-0.47	-4.11	18.97	0.00

TABLE 7 Class membership model Experiment 2

Context: Traffic deaths saved	Class1		Class2		Class3		Wald	p-value
	Est	t-stat	Est	t-stat	Est	t-stat		
Intercept	-0.48	-1.29	-0.48	-1.24	0.96	2.31	5.32	0.07
Covariates								
Education	0.16	2.37	0.14	1.89	-0.30	-3.46	12.10	0.00

Based on the parameter estimates the profile of the education level of members of the three classes can be calculated. Table 8 shows the latent class profiles. For example, an individual belonging to the first class has a probability of 44% of having a university education.

TABLE 8 Latent class profiles Experiment 1 and 2

	Experiment 1: Travel Time savings			Experiment 2: Traffic deaths saved		
	Class 1	Class 2	Class 3	Class 1	Class 2	Class 3
Class Size	54%	33%	13%	44%	37%	19%
Covariates						
Education level						
Elementary school	2%	5%	25%	5%	7%	13%
Lower education	13%	16%	30%	7%	20%	38%
Higher education	42%	44%	36%	54%	33%	39%
University education	44%	35%	9%	33%	41%	11%

---

[8] We had no information about whether or not respondents are daily commuters. Hence, we were not able to test whether this explains class membership. However, because related variables – car ownership and preferred mode of travel – were highly insignificant, we have no reason to believe that including 'commuting behaviour' in the Latent Class Analysis would significantly affect our main conclusions.

5. Conclusion and discussion

5.1 Conclusions

This study presents empirical insights into Dutch citizens' preferences for spatial equality in the context of decision-making regarding the composition of a national transport investment plan. To the best of our knowledge, our study is the first study worldwide which empirically investigates citizens' preferences for the spatial distribution of benefits accruing from a transport investment plan. Our results show that in the context of travel time savings, a vast majority of Dutch citizens has a strong preference for spatial equality. Yet, when the investment program involves traffic safety improvements the share of citizens that have a preference for spatial equality is considerably smaller. Moreover, using Latent class analysis we investigate the presence of heterogeneity in the Dutch population with respect to preferences for spatial equality in the context of a national transport investment plan. Somewhat surprisingly, only 'Education' is found to explain class membership. Highly educated citizens are found to have a relatively strong preference for spatial equality as compared to low educated citizens. Contrary to our expectations, explanatory variables such as political orientation, income, car ownership and region of residence do not appear to associate with citizens' preferences for spatial equality.

Section 5.2 discusses results of this study and proposes avenues for further research. Section 5.3 addresses considerations regarding the incorporating of Dutch citizens' preferences for spatial equality in the design and appraisal of transport projects.

5.2 Discussion and further research

Our study provides convincing evidence that a substantial part of Dutch citizens has a preference for spatial equality in the context of a national transport investment plan. However, we have not been able to infer accurate estimations (as reflected by the relatively large standard errors) of the marginal rate of substitution between the spatial distribution of transport benefits across the Netherlands and the aggregate transport benefits for the Netherlands (i.e. travel time savings and traffic deaths saved). Hence, we regard our study as an important first empirical exploration of citizens' willingness to trade efficiency for spatial equality. We believe a next logical step would be to try to measure the marginal rate of substitution between the spatial distribution of transport benefits across the Netherlands (or another country) and the aggregate transport benefits for the Netherlands (or another country) more accurately, e.g. by replicating this study using a larger sample.

Moreover, we recommend further research into underlying explanations of individuals' preferences for spatial equality in the context of decision-making regarding the composition of a national transport investment program. Johansson-Stenman and Konow (2010) outline that individuals' preferences for an equal distribution can emerge for a variety of reasons (e.g. preferences for proportionality, responsibility, need and equality). We hypothesize that 'proportionality' might be an important rule underlying individuals' preferences for spatial equality, since politicians underpin their argument for a more equal distribution of transport investments across the country by claiming that proportionality should be maintained between agents' inputs (e.g. their contributions in terms of taxes) to the

outputs they receive (e.g. benefits accruing from a transport investment program), see the introduction of this paper. Inferring the extent to which 'proportionality' and/or 'need' are paramount rules underlying our findings can be investigated through carrying out experiments in which; 1) respondents receive information concerning current travel times/risk levels in the two regions (to investigate the importance of 'need'); 2) 'contributions in terms of taxes' differ between the two regions (to investigate the importance of 'proportionality'). Moreover, we contend that underlying explanations of individuals' preferences for spatial equality can be investigated through asking respondents about the reasoning that lies behind their choices.

In addition, we think it is interesting to scrutinize how our finding that highly educated individuals are found to have a relatively strong preference for spatial equality can be explained. We think that a plausible explanation is that it was difficult for low educated respondents to understand the experiment in which they participated which resulted in the adoption of relatively simple and easy to comprehend decision rules (most benefits for the Netherlands or most benefits in my region) compared to decision rules underlying individuals' preferences for spatial equality (e.g. proportionality).

Another interesting direction for further empirical research is investigating the extent to which our results are generalizable to other contexts. Firstly, we recommend a replication of this study in other countries/cultures to investigate the extent to which individuals' preferences for spatial equality differ between countries/cultures. Secondly, we recommend a replication of this study for other effects accruing from transport projects than safety and travel time (e.g. comfort, reliability, health and noise pollution) and also to other ethical notions than spatial equality (e.g. mitigating inequality in accessibility levels between, for instance, income groups). Another empirical question is whether we would find the same results if we would design the experiment in a consumer context. That is, a 'willingness to pay attribute' such as 'additional contribution from your after tax income in euros' is added to the experiments. Perhaps, the intensity of respondents' preferences for spatial distribution will be weaker in a consumer context.

Finally, we think it is interesting to investigate whether the findings of this study are a plausible explanation for the fact that many researchers did not find a significant statistical relation between the final indicator of CBA studies (e.g. net present value or benefit-cost ratio) and political decisions (e.g. Annema et al. 2017; Eliasson et al. 2015; Odeck, 2010). It is conceivable that politicians who want to do justice to the preference of citizens for an equal distribution of transport benefits across regions will assign limited or no value to the results of applied CBA, since the final indicator is insensitive to the distribution of welfare in society.

5.3 Considerations regarding the implications of our results for the design and appraisal of transport projects
Our study primarily contributes to the academic literature by providing empirical insights in individuals' preferences for spatial equality. However, we contend that it is not obvious that our results should be directly translated into actual policy making because several other theories and methods can be used as a point of departure to evaluate the importance of spatial equality in the composition of a national transport investment plan (e.g. van Wee, 2012; van Wee and Roeser, 2013). To give an example, Kantian philosophers might argue that the results of our choice experiments have limited normative value as the respondents were asked

to evaluate the choice options solely based on their consequences. For instance, a fundamental critique of the renowned Kantian philosopher Mark Sagoff (1988) on economics in general, and choice experiments in particular, is that the reasons people give for their views regarding the consequences of policy options are not counted in the analysis. Sagoff (1988) contends that in choice experiments and contingent valuation studies individuals are represented as 'channels' or 'locations' were 'bundles of preferences' can be found. He argues that the Kantian approach, on the other hand, asserts that policy recommendations are to be judged on the basis of individuals' reasons rather than their wants or preferences. The central idea in a Kantian approach to ethics is that some values are more reasonable than others and therefore have a better claim upon the assent of members of the community as such (Sagoff, 1988). According to Sagoff the Kantian approach makes individuals the ultimate source of policy – but it submits policy to their *judgment* rather than deriving it from their *preferences* (our italics). He states that this approach treats people with respect and concern insofar as it regards them as thinking beings capable of discussing issues on their merits. Kantian philosophers such as Sagoff content that individuals should deliberate and then seek to achieve together a conception of the good life society because economic tools, such as choice experiments, deny the educative function of political discussions or persuasion. For instance, Sagoff (1988, p. 27) notes: "*through public conversation we are able to assess goals we attribute to ourselves as a community – as opposed to preferences we might pursue privately. Our system of political representation may be the best available device for deciding on shared values.*" Kahane (2013) observes that so-called 'armchair philosophers' take a more radical position than Sagoff arguing that fairness judgments should not be inferred from deliberations between non-philosophers. These philosophers content that fairness judgments should be left to the reflective judgments of ethicists, who are trained to define fair distributions through a back and forth between particular fairness intuitions and general moral principles (Kahane, 2013).

Taking a final stance in the debate concerning the extent to which policies should be based on individuals' preferences inferred from choice experiments, the community's shared values obtained from deliberative processes or philosophical reasoning lies far outside the scope of this paper. However, in line with ideas of Sen (2009) we think that results inferred from empirical experiments such as choice experiments should complement and not replace public deliberation. Results from empirical studies are helpful (see de Jong and Geerlings, 2003; Mouter et al., 2013b; Mouter 2017), but also deliberation, or more generally: the process, matters because citizens' judgments can be influenced by deliberation and people may value their role in decision making, regardless the outcomes (van Wee, 2012). Following Johansson-Stenman and Martinsson (2008), we believe that the results of our study, at the very least, provide valuable input for deliberative processes and philosophical reasoning concerning a fair distribution of effects accruing from a transport investment program (across the Netherlands). For instance, the observation that a larger proportion of (Dutch) citizens' has a preference for spatial equality when the benefits involve travel time savings than when the benefits involve safety improvements – and that these preferences do not appear to be associated with political orientation, income and region of residence – might facilitate a more informed and nuanced discussion regarding the importance of spatial equality in the design and appraisal and decision-making regarding transport policies.

More generally, we agree with Chorus (2015) that it is worth exploring in further research how choice experiments can be used to gain new insights into the moral decision making of citizens and politicians, and at the same time, explore how ideas from the moral decision making literature may be used to enhance the behavioral realism of choice experiments. Chorus (2015) observes that a growing group of scholars from the ethics community and adjacent fields has been arguing for the need to do experimental, data-driven research into moral judgment and decision-making (e.g. Bauman et al., 2014; Kahane, 2013). For instance, Kahane (2013) notes that empirical evidence could serve as a tie-breaker, tipping the balance by identifying which of the competing moral principles in some domain is the one that is in fact causally operative. Furthermore, Chorus (2015) surveys how choice experiments can add a rigorous empirical perspective to moral philosophy, by enabling the econometric identification of decision strategies based on observed choices (made in real life or experimental conditions). To increase the behavioral realism of choice experiments in contexts with a moral dimension we propose to explore the added value of choice experiments that allow for rich deliberation and reflection among respondents before they conduct the choice tasks ('deliberative stated choice experiments') and investigate the extent to which, amongst others, citizens, philosophers and politicians regard results inferred from such choice experiments as more relevant input for decision-making than conventional choice experiments.

Another point for discussion concerns the implications of the results obtained from this study for standard appraisal tools such as Cost-Benefit Analysis. To the best of our knowledge, there are currently no countries that systematically include citizens' preferences for spatial equality in the appraisal of transport projects. In practice, CBA reports at best provide information concerning the spatial distributional consequences of specific transport projects/policies by reporting the net present value of the project/policy under scrutiny for specific regions or by providing a 'winners and losers' table in the report (e.g. Annema et al., 2007; HEATCO, 2006). Hence, a remaining question that we will address below is whether citizens' preferences for spatial equality in the context of an investment program should be incorporated into applied welfare analysis (particularly Cost-Benefit Analysis) and, if so, how? Below, we discuss two possible answers to this question.

Johansson-Stenman and Konow (2010) argue that individuals' utility derived from perceived distributional concerns, such as spatial equality, should count in a welfare analysis, since there are no good arguments why individuals' utility derived from perceived fairness concerns should count less than the same amount of utility derived for any other reason. Various scholars argue that a practicable method for incorporating individuals' distributional concerns in a social welfare analysis involves combining Cost-Benefit Analysis with distributional weights (e.g. Adler, 2012, 2013; Boadway and Bruce, 1984; Dasgupta and Pearce 1972; Dreze and Stern 1987). The implication of incorporating individuals' preferences for spatial equality in applied welfare analysis through distributional weights is that projects from which benefits accrue to regions which receive relatively less benefits from the national investment program in infrastructure projects are likely to be relatively more attractive from a societal point of view when compared to projects from which benefits accrue to regions which receive relatively many benefits from the national investment program in infrastructure projects.

A well-known argument against incorporating individuals' distributional concerns in applied welfare analysis conveyed by Harberger (1978) is that if policy makers want to consider distributional concerns in their decisions, they should always consider to achieve this goal through amending the tax policy instead of using distributional weights in Cost-Benefit Analysis because from a societal point of view amending the tax policy is more efficient than handling this particular distributional goal via government projects such as building roads or public parks. More specifically, the preference of Dutch citizens identified in this study should be handled – according to the line of arguing of Harberger – by the tax system and the results should have no implications for the appraisal of transport projects. Following Harberger's argument policy makers might consider to diminish (increase) the taxes paid in the regions of the Netherlands that receive relatively few (many) transport benefits from government projects. Another change in the tax system one can think of is a full decentralization of the taxes (and investments) concerning infrastructure projects. That is, regions are charged with the responsibility of investments in transport projects and also raise local/regional taxes for transport investments.

For the period of time in which it is not clear if and how the empirical insights derived from this study should be integrated into applied welfare analysis, we recommend to inform politicians and civil servants who are charged with composing (national) infrastructure investment programs about the spatial distribution of transport benefits accruing from an investment program to better enable them to consider both the aggregate benefits of the investment program and the distribution of benefits across regions in their decisions.

Acknowledgement

6. References

Adler, M., 2012. Well-Being and Fair Distribution: Beyond Cost-Benefit Analysis. Oxford University Press, Oxford.

Adler, M., 2013. Cost -Benefit Analysis and Distributional Weight: An Overview.

Andreoni, J., Miller, J., 2002. Giving according to GARP: an experimental test of the consistency of preferences for altruism. Econometrica 70(2),737–753.

Annema, J.A., Koopmans, C.C., Van Wee, B., 2007. Evaluating transport infrastructure investments: the Dutch experience with a standardised approach. Transport Reviews 27(2), 125–150.

Annema, J.A., Frenken, K., Koopmans, C.C., Kroesen, M., 2017. Relating cost-benefit analysis results with transport project decisions in the Netherlands. Letters in Spatial and Resource Sciences 10 (1), 109-127.

Bauman, C.W., Mc Graw, A.P., Bartels, D.M., Warren, C. 2004. Revisiting external validity: Concerns about trolley problems and other sacrificial dilemmas in moral psychology. Social and Personality Psychology Compass 8 (9), 536-554.

BNR, 2016a. Bouwmeesters. Weekly newsprogram about the construction sector. www.bnr.nl

BNR, 2016b. Christian-Democrats think that the budget for transport investments should be distributed in a more fair way. September 14th 2016. www.bnr.nl

Bahamonde-Birke, F.J., Kunert, U., Link, H., 2015. The Value of a Statistical Life in a Road Safety Context — A Review of the Current Literature. Transport Reviews, 35(4), 488-511.

Boadway, R., Bruce. N., 1984. Welfare Economics. Oxford: Basil Blackwell.

Börjesson, M., Eliasson, J., 2014. Experiences from the Swedish value of time study. Transportation Research Part A: Policy and Practice 59, 144-158.

Brodie, S. R., 2015. Equality considerations for long-range transportation planning and program development. Dissertation, Georgia Institute of Technology.

Cardell, N., Dunbar, F.C., 1980. Measuring the societal impacts of automobile downsizing. Transportation Research Part A: General 14 (5-6), 423-434.

Carson, R.T., Groves, T., 2007. Incentive and informational properties of preference questions. Environmental and Resource Economics 37, 181 - 200.

Chorus, C.G., 2015. Models of moral decision making: Literature review and research agenda for discrete choice analysis. Journal of choice modelling 16, 69-85.

Daly, A., Hess, S., de Jong, G., 2012. Calculating errors for measures derived from choice modeling estimates. Transportation Research Part B 46, 333-341.

Dasgupta, A.K., Pearce., D.W., 1972. Cost-Benefit Analysis: Theory and Practice. New York: Harper and Row.

De Jong., D.M., Geerlings, H., 2003. Exposing weaknesses in interactive planning: the remarkable return of comprehensive policy analysis in The Netherlands. Impact Assessment and Project Appraisal 21 (4), 281-291.

Dreze, J., Stern., 1987. The Theory of Cost-Benefit Analysis. In Handbook of Public Economics, ed. Alan J. Auerbach and Martin Feldstein, vol. 2, 909-989. Amsterdam: North-Holland.

Eliasson, J., Börjesson, M., Odeck, J., Welde, M., 2015. Does benefit-cost efficiency influence transport investment decisions? Journal of Transport Economics and Policy 49, 377–396.

Fridstrøm, L., Elvik, R., 1997. The barely revealed preference behind road investment priorities. Public Choice, 92, 145–168.

Graham, D.J., 2007. Agglomeration, Productivity and Transport Investment. Journal of Transport Economics and Policy 41 (3), 317–343.

Golub, A., Martens, K., 2014. Using principles of justice to assess the modal equality of regional transportation plans. Journal of Transport Geography 41, 10-20.

Harberger, A., 1978. On the Use of Distributional Weights in Social Cost-Benefit Analysis. Journal of Political Economy. 86: S87-S120.

HEATCO, 2006. Developing Harmonised European Approaches for Transport Costing and Project Assessment. Deliverable 5: proposal for harmonised guidelines.

Hensher, D. A., Rose, J.M., Ortúzar, J. de. D., Rizzi, L.I., 2009. Estimating the willingness to pay and value of risk reduction for car occupants in the road environment. Transportation Research Part A, 43(7), 692–707.

Hess, S., Ben-Akiva, M., Gopinath, D., Walker, J. 2011. Advantages of latent class over continuous mixture of logit models, Working paper, ITS, University of Leeds.

Johansson-Stenman, O., Martinsson, P., 2008. Are some lives more valuable? An ethical preferences approach.

Johansson-Stenman, O., Konow, J. 2010. Fair air: Distributive justice and environmental economics. Environmental Resource Economics 46, 147-166. Journal of Health Economics 27, 739–752.

Johnston, R.J., Boyle, K.J., Adamowicz, W., Bennett, J., Brouwer, R., Cameron, T.A., Hanemann, W.M., Hanley, N., Ryan, M., Scarpa, R., Tourangeau, R., Vossler, C.A., 2017. Contemporary guidance for stated preference studies. Journal of the Association of Environmental and Resource Economists (forthcoming)

Kahane, G., 2013. The armchair and the trolley: an argument for experimental ethics. Philosophical studies 162 (2), 421-455.

Karner, A., Niemeier, D., 2013. Civil rights guidance and equality analysis methods for regional transportation plans: A critical review of literature and practice. Journal of Transport Geography 33, 126-134.

Khisty, C., 1996. Operationalizing concepts of equality for public project investments. Transportation Research Record, 1559 (1), 94-99.

Kouwenhoven, M., de Jong, G.C., Koster, P., van den Berg, V.A.C., Verhoef, E.T., Bates, J., Warffemius, P.M.J., 2014. New values of time and reliability in passenger transport in The Netherlands. Research in Transportation Economics. 47, 37–49.

Landry, G.F., List, J.A., 2007. Using ex ante approaches to obtain credible signals for value in contingent markets: evidence from the field. American journal of agricultural economics 89 (2), 420-429.

Lucas, K., van Wee, G.P., Maat, K., 2016. A method to evaluate equitable accessibility: combining ethical theories and accessibility-based approaches. Transportation 43, 473-490.

Mackie, P.J., T. Worsley and J. Eliasson. 2014. Transport Appraisal Revisited. Research in Transportation Economics. Vol. 47, pp. 3-18.

Mackie, P.J., S. Jara-Diaz, A.S. Fowkes., 2001. The value of travel time savings in evaluation. Transportation Research Part E 37, 91-106.

Martens, K., 2016. Transport Justice: designing fair transportation systems. London: Routledge.

Martens, K., Golub, A., 2012. A justice-theoretical exploration of accessibility measures. In K.T. Geurs, K.J. Krizek, A. Reggiani & Network on European Communications and Transport Activity Research (Eds.). Accessibility analysis and transport planning: challenges for Europe and North America (pp. 195-210). Cheltenham: Edward Elgar.

Martens, K., Golub, A., Robinson, G., 2012. A justice-theoretic approach to the distribution of transportation benefits: implication for transportation planning practice in the United States. Transportation Research Part A 46 (4). 684-695.

Mouter, N., 2016. Dutch Politicians' Use of Cost-Benefit Analysis. Transportation. Published online. DOI 10.1007/s11116-016-9697-3

Mouter, N., 2017. Dutch politicians' attitudes towards Cost-Benefit Analysis. Transport Policy 54, 1-10.

Mouter, N., Annema, J.A., Van Wee, B., 2013a. Ranking the substantive problems in the Dutch Cost-Benefit Analysis practice. Transportation Research Part A 49, 241-255.

Mouter, N., Annema, J.A., Van Wee, B., 2013b. Attitudes towards the role of Cost-Benefit Analysis in the decision-making process for spatial-infrastructure projects: a Dutch case study. Transp. Res. Part A 58, 1‑18.

Mouter, N., Chorus, C.G., 2016. Value of Time: a citizen perspective. Transportation Research Part A 91, 317-329.

Nellthorp, J., Mackie, P.J., 2000. The UK roads review – A hedonic model of decision making. Transport Policy 7, 127–138.

Nguyen-Hoang, P. and Yeung, R., 2010. What is paratransport worth?. Transportation Research Part A 44 (10), 841-853.

Neutens, T., Schwanen, T., Witlox, F., Maeyer, P.D., 2010. Equality of urban service delivery: a comparison of different accessibility measures. Environment and Planning A 42 (7), 1613-1635.

Nyborg, K., 1998. Some Norwegian politicians' use of cost-benefit analysis. Public Choice. 95, 381-401.

Odeck, J., 1996. Ranking of regional road investment in Norway. Transportation 23, 123–140.

Odeck, J., 2010. What determines decision-makers' preferences for road investments? Evidence from the Norwegian road sector. Transport Reviews, 30(4), 473-94.

Ojeda-Cabral, M., Batley, R., Hess, S., 2016. The value of travel time: random utility versus random valuation. Transportmetrica A: Transport Science 12 (3), 230-248.

Pereira, R. H. M., Schwanen, T., Banister, D., 2016. Distributive justice and equality in transportation. Transport Reviews. Online available DOI: 10.1080/01441647.2016.1257660

Rietveld, P., Rouwendal, J., Vlist, A.J. van der (2007). Equality issues in the evaluation of transport policies and transport infrastructure projects. In M. Geenhuizen van, A. Reggiani, & Rietveld, P. (Eds.), Policy Analysis of Transport Networks (pp. 19-36). Aldershot: Ashgate.

Rose, J, M and Bliemer, M.C.J., 2009. Constructing Efficient Stated Choice Experimental Designs. Transport Reviews, 29: 5, 587 — 617.

Rotaris, L. Danielis, R., Marcucci, E., Massiani, J., 2010. The urban road pricing scheme to curb pollution in Milan, Italy: Description, impacts and preliminary cost-benefit analysis assessment. Transportation Research Part A 44 (5), 359-375.

Saelensminde, K., 2004. Cost-benefit analysis of walking and cycling track networks taking into account insecurity, health effects and external costs of motorized traffic. Transportation Research Part A 38 (8), 593-606.

Sager, T., 2016. Why don't cost-benefit results count for more? The case of Norwegian road investment priorities. Urban, Planning and Transport Research 4 (1), 101-121, DOI: 10.1080/21650020.2016.1192957

Sager, T., Ravlum. I.A., 2005. The political relevance of planners' analysis: the case of a parliamentary standing committee. Planning Theory 4 (1), 33-65.

Sagoff, M., 1988. The economy of the earth. Cambridge University press. Cambridge.

Sen, A., 2009. The Idea of Justice. Allen Lane, London.

Stahl, D., Haruvy, E., 2009. Testing theories of behavior for extensive-form two-player two-stage games. Experimental Economics 12 (2), 242–251.

Thomopoulos, N., S. Grant-Muller and M. Tight. 2009. Incorporating equality considerations in transport infrastructure evaluation: current practice and a proposed methodology. Evaluation and Program Planning 32, 351–359.

Van der Hoeven, N., 2015. The use of argumentation in transport infrastructure debates: an analysis. Delft University of Technology. Thesis Repository.

Van Wee, B., 2012. How suitable is CBA for the ex-ante evaluation of transport projects and policies? A discussion from the perspective of ethics. Transport Policy 19 (1), 1-7.

Van Wee, G.P., Geurs, K.T., 2011. Discussing equality and social exclusion in accessibility evaluations. European Journal of Transport and Infrastructure Research 11 (4).

Van Wee, G.P., Roeser, S., 2013. Ethical theories and the cost-benefit analysis-based ex ante evaluation of transport policies and plans. Transport Reviews 33 (6), 743-760.

Vossler, C.A., Evens, M.F., 2009. Bridging the gap between the field and the lab: Environmental goods, policy maker input, and consequentiality. Journal of Environmental Economics and Management 58 (3), 338-345.

Zawojska, E., Czajkowski, M. 2015. Re-examining empirical evidence on contingent valuation–Importance of incentive compatibility.

Appendix A

Appendix Table 1 presents per choice task: 1) for each choice alternative the travel time savings for inhabitants of Region A and Region B; 2) the characteristic(s) on which the alternative of the investment program was the superior alternative; 3) the percentage of respondents who recommended an alternative of the investment program. To illustrate, for choice task 1 Alternative 1 of the investment program results in 12 minutes time savings and 1 minute of time savings for inhabitants of Region A and Region B respectively. The choice alternative is superior on: 'aggregate time savings for Dutch inhabitants' and 'time savings for inhabitants Region A' and 29% of the respondents recommended this investment program.

Appendix Table 1: choice situations and number of respondents choosing choice alternatives experiment 1

	Alternative 1	Alternative 2	Alternative 3
1	Time Savings Reg. A: 12 min. Time Savings Reg. B: 1 min. Superior on: Aggregate and Reg. A **Resp. choosing Alternative**: 29%	Time Savings Reg. A: 1 min. Time Savings Reg. B: 11 min. Superior on: Reg. B **Resp. choosing Alternative**: 22%	Time Savings Reg. A: 6 min. Time Savings Reg. B: 3 min. Superior on: Equality **Resp. choosing Alternative**: 49%
2	Time Savings Reg. A: 2 min. Time Savings Reg. B: 9 min. Superior on: Reg. B **Resp. choosing Alternative**: 13%	Time Savings Reg. A: 6 min. Time Savings Reg. B: 6 min. Superior on: Equality **Resp. choosing Alternative**: 66%	Time Savings Reg. A: 12 min. Time Savings Reg. B: 1 min. Superior on: Aggregate and Reg. A **Resp. choosing Alternative**: 22%
3	Time Savings Reg. A: 7 min. Time Savings Reg. B: 5 min. Superior on: Aggregate and Equality **Resp. choosing Alternative**: 59%	Time Savings Reg. A: 4 min. Time Savings Reg. B: 8 min. Superior on: Aggregate and Reg. B **Resp. choosing Alternative**: 29%	Time Savings Reg. A: 9 min. Time Savings Reg. B: 1 min. Superior on: Reg. A **Resp. choosing Alternative**: 13%
4	Time Savings Reg. A: 6 min. Time Savings Reg. B: 4 min. Superior on: Equality **Resp. choosing Alternative**: 29%	Time Savings Reg. A: 10 min. Time Savings Reg. B: 1 min. Superior on: Reg. A **Resp. choosing Alternative**: 18%	Time Savings Reg. A: 5 min. Time Savings Reg. B: 7 min. Superior on: Aggregate, Equality and Reg. B **Resp. choosing Alternative**: 53%
5	Time Savings Reg. A: 12 min. Time Savings Reg. B: 1 min.	Time Savings Reg. A: 11 min. Time Savings Reg. B: 3 min.	Time Savings Reg. A: 4 min. Time Savings Reg. B: 4 min.

	Superior on: Reg. A **Resp. choosing Alternative**: 15%	Superior on: Aggregate **Resp. choosing Alternative**: 32%	Superior on: Equality and Reg. B **Resp. choosing Alternative**: 53%
6	Time Savings Reg. A: 1 min. Time Savings Reg. B: 9 min. Superior on: Reg. B **Resp. choosing Alternative**: 9%	Time Savings Reg. A: 12 min. Time Savings Reg. B: 2 min. Superior on: Aggregate and Reg. A **Resp. choosing Alternative**: 25%	Time Savings Reg. A: 6 min. Time Savings Reg. B: 8 min. Superior on: Aggregate and Equality **Resp. choosing Alternative**: 66%
7	Time Savings Reg. A: 7 min. Time Savings Reg. B: 9 min. Superior on: Aggregate and Equality **Resp. choosing Alternative**: 45%	Time Savings Reg. A: 2 min. Time Savings Reg. B: 12 min. Superior on: Reg. B **Resp. choosing Alternative**: 17%	Time Savings Reg. A: 8 min. Time Savings Reg. B: 6 min. Superior on: Equality and Reg. A **Resp. choosing Alternative**: 39%
8	Time Savings Reg. A: 9 min. Time Savings Reg. B: 3 min. Superior on: Aggregate **Resp. choosing Alternative**: 50%	Time Savings Reg. A: 10 min. Time Savings Reg. B: 1 min. Superior on: Reg. A **Resp. choosing Alternative**: 11%	Time Savings Reg. A: 3 min. Time Savings Reg. B: 5 min. Superior on: Equality and Reg. B **Resp. choosing Alternative**: 39%
9	Time Savings Reg. A: 5 min. Time Savings Reg. B: 5 min. Superior on: Equality **Resp. choosing Alternative**: 63%	Time Savings Reg. A: 1 min. Time Savings Reg. B: 10 min. Superior on: Aggregate and Reg. B **Resp. choosing Alternative**: 18%	Time Savings Reg. A: 8 min. Time Savings Reg. B: 1 min. Superior on: Reg. A **Resp. choosing Alternative**: 19%
10	Time Savings Reg. A: 1 min. Time Savings Reg. B: 12 min. Superior on: Aggregate and Reg. B **Resp. choosing Alternative**: 18%	Time Savings Reg. A: 4 min. Time Savings Reg. B: 5 min. Superior on: Equality **Resp. choosing Alternative**: 51%	Time Savings Reg. A: 10 min. Time Savings Reg. B: 2 min. Superior on: Reg. A **Resp. choosing Alternative**: 32%

Appendix Table 2 presents per choice task: 1) for each choice alternative the reduction of traffic deaths per year in Region A and Region B; 2) the characteristic(s) on which the alternative of the investment program was the superior alternative; 3) the percentage of respondents who recommended an alternative of the investment program. To illustrate, for choice task 1 Alternative 1 of the investment program results in 23 traffic deaths saved in Region A and 2 traffic deaths saved in Region B respectively. The choice alternative is superior on: 'aggregate traffic deaths saved in the Netherlands' and 'traffic deaths saved in Region A' and 36% of the respondents recommended this investment program.

Appendix Table 2: choice situations and number of respondents choosing choice alternatives experiment 2

	Alternative 1	Alternative 2	Alternative 3
1	Traffic deaths saved Reg. A: 23 Traffic deaths saved Reg. B: 2 Superior on: Aggregate and Reg. A **Resp. choosing Alternative**: 36%	Traffic deaths saved Reg. A: 4 Traffic deaths saved Reg. B: 18 Superior on: Reg. B **Resp. choosing Alternative**: 9%	Traffic deaths saved Reg. A: 12 Traffic deaths saved Reg. B: 12 Superior on: Equality **Resp. choosing Alternative**: 55%
2	Traffic deaths saved Reg. A: 7 Traffic deaths saved Reg. B: 31 Superior on: Reg. B **Resp. choosing Alternative**: 9%	Traffic deaths saved Reg. A: 20 Traffic deaths saved Reg. B: 20 Superior on: Equality **Resp. choosing Alternative**: 56%	Traffic deaths saved Reg. A: 40 Traffic deaths saved Reg. B: 1 Superior on: Aggregate and Reg. A **Resp. choosing Alternative**: 35%
3	Traffic deaths saved Reg. A: 15 Traffic deaths saved Reg. B: 13 Superior on: Aggregate and Equality **Resp. choosing Alternative**: 60%	Traffic deaths saved Reg. A: 10 Traffic deaths saved Reg. B: 18 Superior on: Aggregate and Reg. B **Resp. choosing Alternative**: 32%	Traffic deaths saved Reg. A: 22 Traffic deaths saved Reg. B: 3 Superior on: Reg. A **Resp. choosing Alternative**: 8%
4	Traffic deaths saved Reg. A: 13 Traffic deaths saved Reg. B: 10 Superior on: Aggregate and Equality **Resp. choosing Alternative**: 9%	Traffic deaths saved Reg. A: 20 Traffic deaths saved Reg. B: 2 Superior on: Reg. A **Resp. choosing Alternative**: 10%	Traffic deaths saved Reg. A: 11 Traffic deaths saved Reg. B: 14 Superior on: Aggregate, Equality and Reg. B **Resp. choosing Alternative**: 81%

5	Traffic deaths saved Reg. A: 30 Traffic deaths saved Reg. B: 6 Superior on: Reg. A **Resp. choosing Alternative**: 5%	Traffic deaths saved Reg. A: 26 Traffic deaths saved Reg. B: 13 Superior on: Aggregate **Resp. choosing Alternative**: 71%	Traffic deaths saved Reg. A: 15 Traffic deaths saved Reg. B: 15 Superior on: Equality and Reg. B **Resp. choosing Alternative**: 24%
6	Traffic deaths saved Reg. A: 2 Traffic deaths saved Reg. B: 16 Superior on: Reg. B **Resp. choosing Alternative**: 5%	Traffic deaths saved Reg. A: 18 Traffic deaths saved Reg. B: 3 Superior on: Aggregate and Reg. A **Resp. choosing Alternative**: 21%	Traffic deaths saved Reg. A: 10 Traffic deaths saved Reg. B: 11 Superior on: Aggregate and Equality **Resp. choosing Alternative**: 73%
7	Traffic deaths saved Reg. A: 11 Traffic deaths saved Reg. B: 6 Superior on: Equality and Reg. A **Resp. choosing Alternative**: 15%	Traffic deaths saved Reg. A: 7 Traffic deaths saved Reg. B: 12 Superior on: Aggregate and Equality **Resp. choosing Alternative**: 75%	Traffic deaths saved Reg. A: 1 Traffic deaths saved Reg. B: 14 Superior on: Reg. B **Resp. choosing Alternative**: 10%
8	Traffic deaths saved Reg. A: 9 Traffic deaths saved Reg. B: 11 Superior on: Equality **Resp. choosing Alternative**: 45%	Traffic deaths saved Reg. A: 20 Traffic deaths saved Reg. B: 1 Superior on: Reg. A **Resp. choosing Alternative**: 11%	Traffic deaths saved Reg. A: 2 Traffic deaths saved Reg. B: 20 Superior on: Aggregate and Reg. B **Resp. choosing Alternative**: 45%
9	Traffic deaths saved Reg. A: 11 Traffic deaths saved Reg. B: 6 Superior on: Reg. A **Resp. choosing Alternative**: 5%	Traffic deaths saved Reg. A: 5 Traffic deaths saved Reg. B: 15 Superior on: Aggregate and Reg. B **Resp. choosing Alternative**: 61%	Traffic deaths saved Reg. A: 10 Traffic deaths saved Reg. B: 8 Superior on: Equality **Resp. choosing Alternative**: 33%
10	Traffic deaths saved Reg. A: 6 Traffic deaths saved Reg. B: 10 Superior on: Aggregate and Reg. B **Resp. choosing Alternative**: 59%	Traffic deaths saved Reg. A: 8 Traffic deaths saved Reg. B: 7 Superior on: Equality **Resp. choosing Alternative**: 31%	Traffic deaths saved Reg. A: 12 Traffic deaths saved Reg. B: 2 Superior on: Reg. A **Resp. choosing Alternative**: 10%