

Over een paradigmawisseling: uitvoeren van MKBA's vanuit een burgerperspectief in plaats van uit een consumentenperspectief

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Samenvatting

In maatschappelijke kosten-batenanalyses (MKBA's) worden effecten van infrastructuurprojecten gewaardeerd vanuit een consumentenperspectief. Om bijvoorbeeld de reistijdwinsten van een infrastructuurproject te waarderen wordt door middel van Stated Choice experimenten gemeten hoeveel euro Nederlanders vanuit een inkomen na belasting bereid zijn te besteden voor een uur reistijdwinst. Deze 'Value of Time' is zonder twijfel interessant voor private partijen. Voor een bedrijf dat een tolweg aanlegt is het belangrijk om te weten hoeveel geld mensen overhebben voor reistijdwinst bij het bepalen van de tol. Maar is dit waarderingsgetal ook relevant voor het beoordelen van overheidsprojecten? Verschillende wetenschappers betogen dat dit niet het geval is. Hun stelling is dat preferenties van mensen in hun rol als consument kunnen verschillen van preferenties in hun rol als burger. Dit wordt ook wel economische schizofrenie genoemd. Indien de burgerwaarde verschilt van de consumentenwaarde, dan is de burgerwaarde relevant voor het beoordelen van overheidsprojecten, aldus de wetenschappers. Hoewel de wetenschappers goed uitwerken waarom de burgerwaarde kan verschillen van de consumentenwaarde, laten zij na om de burgerwaarde goed te operationaliseren. In dit paper vullen wij dit kennisgat. Daarnaast meten wij de burgerwaarde en de consumentenwaarde voor één van de belangrijkste parameters in de MKBA: 'de Value of Time'. Op het CVS presenteren wij onze resultaten, maar willen we vooral graag met de deelnemers discussiëren over de interpretatie van de resultaten en het concept 'burgerwaarde'.

1. Introduction

Without a doubt, the notion of a traveler's Value of Time (VoT) is one of the most important and well-researched concepts in transport economics. VoT is a key ingredient of Cost-Benefit Analyses of transport policies and infrastructure projects; it transforms travel time gains, which often constitute the large majority of benefits of policies and projects, into monetary benefit estimates which allows for a consistent comparison with project costs. Since the advent of choice models and stated choice (SC) data collection methods in the mid-1970s, hundreds, if not thousands, of SC-studies have been undertaken to derive travelers' marginal rate of substitution between travel time and travel costs (e.g. Abrantes and Wardman, 2011; Mackie et al., 2001; Ojeda-Cabral, 2015). In the overwhelming majority of such experiments, individuals are asked to make a choice between different travel options (usually routes) with different travel times and travel costs (e.g. Fosgerau et al., 2007; Börjesson and Eliasson, 2014; Kouwenhoven et al., 2014). Crucially, in these experiments travelers are asked to make these choices as if they were paying travel costs from their own budget (whereas transport projects are paid by taxes), and as if the travel time is only experienced by themselves (whereas the benefits of projects are typically experienced by large numbers of travelers).

This so-called consumer sovereignty-based approach to estimate the monetary value of non-market goods such as travel time gains, has been contested by several economic-philosophers (e.g. Ackerman and Heinzerling, 2002, Kelman, 1981, Marglin, 1963, Nyborg, 2012; Sagoff, 1988; Sunstein, 2005). These scholars argue that decisions of individuals in their role as *consumers* (such as those observed in conventional SC-experiments into VoT) are likely to be a poor proxy of how the same individuals in their role as *citizens* believe that Government should allocate tax payers' money. Critics of this 'citizens sovereignty-based approach' have in turn argued that although its supporters showcase a parade of appealing real world examples in which the assessment of an individual in her role as a consumer clearly deviates from the assessment in her role as a citizen, they fail to provide a convincing alternative for an assessment of Government projects based on micro-economic theory (Hanley, 2009).

We observe that the heated debate concerning the usefulness of the 'consumer sovereignty-based approach' and the 'citizen sovereignty-based approach' for policy appraisal, has so far been purely normative. Especially arguments supporting the latter approach are based on thought experiments and normative value judgements. It is striking that so far, no empirical evidence has been put forward which scrutinizes whether 'consumer values' in fact *differ* from 'citizen values'. Also for the VoT it is unclear if and to what extent an individual's trade-off between time and money for her personal travel (i.e., her consumer VoT) would differ from her beliefs concerning how Government should trade-off travel time and tax money when evaluating transport policies (i.e., her citizen VoT). In this paper, we fill this gap, by means of collecting and analyzing travel choice data in a series of carefully constructed SC experiments. More specifically, by careful use of wording in the experimental set-up, we are able to frame choice tasks as either a typical 'consumer' choice, a typical 'citizen' choice, and several in-between framings. Choice models are then estimated, and the implied VoTs obtained from these estimations are compared across frames. As we will show, this leads to valuable empirical – as opposed to normative – insights into the presence and meaning of differences between consumer- and citizen-VoTs.

Crucially, throughout this paper we adopt a completely agnostic standpoint regarding the above mentioned *normative* debate concerning whether 'consumer VoTs' or 'citizen VoTs' should be used in evaluating transport policies. We merely aim to add *empirical* knowledge about the actual difference between these VoT-notions, which may help guide and shape this debate in the future. In section 2, we conceptualize and operationalize our different framings of consumer- and citizen-VoT. Section 3 discusses data collection and analysis. Subsequently, we present and interpret results in section 4. In section 5 we draw conclusions and raise further topics for discussion.

2. Conceptualization and operationalization of consumer- and citizen-VoT

In the broader Economics literature, it has been well-established that preferences of individuals in their role as consumers are restricted by their budget constraints (e.g. Fuguitt et al., 1999; Sagoff, 1988). In other words, observing consumer preferences involves observing how individuals allocate their after-tax income in (hypothetical) markets (Sagoff, 1988). On the contrary, observing preferences of individuals in their role as citizens involves observing their behavior in public social life (e.g. Kelman et al., 1981); individuals display their preferences as citizens supporting or opposing Government policies in public spheres like elections, referenda, demonstrations and social media, etc. Although an analysis of the expressions of individuals in these public spheres is useful for eliciting the attitudes of citizens towards Government policies, citizens' Willingness to Pay for specific aspects of a policy (e.g. her VoT in the context of a particular transport policy) cannot be directly derived from these expressions. To enable the derivation of citizen-VoT and facilitate a direct comparison with consumer-VoT, we adopt the SC data collection paradigm as one single empirical approach for both the citizen- and consumer-perspectives on VoT. Under this generic methodological umbrella, we carefully and systematically frame choice tasks in a way that allows us to distinguish between consumer- and citizen-VoTs and in-between variants. Our frames of citizen-VoT are inspired by three different argumentations that have been put forward in the normative debate which we summarized in the Introduction (note again that although we adopt these criticisms in our experimental design, we do not wish to state our (dis-)agreement with any of these criticisms; this is an empirical paper).

1. In a consumer choice experiment the respondent is supposed to trade off time gains with money spent from her own budget, after taxes. In contrast, the vast majority of transport policy decisions involve the allocation of previously collected taxes.
2. In 'consumer' SC experiments respondents are confronted with a route choice situation for their personal travels, involving small and individual time gains and travel costs. However, trade-offs that have to be made by Government in real world transport policies involve huge benefits and costs, distributed amongst very large numbers of travelers and tax payers.
3. An individual in her role as consumer (in a typical SC-experiment) is typically supposed to make a fresh trade-off between travel time and travel costs every time she decides to make a trip. This contrasts with the notion that a Government's transport policies and infrastructure investment decisions generally involve a onetime, lumpsum, allocation of (tax) money.

By combining elements from these three lines of criticism raised in normative debates, we designed eight different frames, which are all located at a different spot on the continuum between 'pure' consumers' and citizens' perspectives. The differences between the eight frames only echo through in the introductory text preceding the different choice tasks. That is, we kept the choice tasks themselves (in terms of the time gains and costs involved) identical across all frames, to allow for maximum consistency in our empirical comparisons. More specifically, this approach allows us to treat each frame as a context which may interact with the estimated VoTs, and to statistically infer how an individual's VoT differs between frames. Note also that we varied frames between, but not within participants; that is, to avoid confusion, every participant was only presented with 16 choice tasks for one single frame. Below, we present each frame in some detail; note that in the next Section, we will discuss how attribute levels and ranges were selected.

Frame 1: Consumer VoT – the classical approach

The design of Frame 1 resembles the frame that is used in conventional VoT studies (e.g. Borjesson and Eliasson, 2014; Fosgerau et al., 2007; Mackie et al., 2001; Ojeda-Cabral,

2015), in that respondents were asked to choose between her current route and a faster but more expensive alternative.¹

We ask you to choose one of the two routes:
 Route A: the route you usually take for commuting.
 Route B: an alternative route which is faster, but more expensive.

	Route A (Current commute)	Route B (Alternative Route)
Time savings, per trip	-	11 minutes
Extra costs, per trip	-	0.60 euro

FIGURE 1 Design of frame 1.

Frame 2: Consumer VoT in the context of a road expansion

The design of Frame 2 incorporates the first step away from a full consumer perspective towards incorporating elements of a citizen perspective. More specifically, rather than framing the choice as being between two different routes, we now ask respondents in a referendum-type question whether or not they agree with a Government intervention in the form of a road expansion which makes their commute faster, but more expensive.

We ask you to think of the following situation:
 The Government considers a road expansion aimed at reducing travel times.
 We ask you whether you would choose for the road expansion, or not.
 You can assume the following:

- You use the road for commuting and therefore would benefit from the road expansion;
- As a result of the road expansion your commute will be faster, but more expensive;
- No road expansion implies no costs and no travel time savings for you;
- The construction work will be carried out in the middle of the night, so you will not experience any nuisance.

	No road expansion	Road Expansion
Time savings, per trip	-	11 minutes
Extra costs, per trip	-	0.60 euro

FIGURE 2 Design of frame 2.

Frame 3: Citizen VoT in the context of a road expansion

In this frame, respondents are asked whether they support the allocation of previously collected taxes to a road expansion which decreases their personal travel time. Since the tradeoff which the respondent faces now involves previously collected taxes instead of her own after tax income, this task comes close to a pure citizen perspective.

¹ Note that all choice tasks are WTP scenarios. In conventional VoT studies respondents also complete WTA scenarios. However, since for some of the frames WTA choice tasks were unrealistic we only presented respondents with WTP scenarios.

We ask you to think of the following situation:

The Government considers a road expansion aimed at reducing travel times.

We ask you whether you would choose for the road expansion, or not.

You can assume the following:

- The road expansion is financed out of tax money;
- **Total taxes do not increase** as a result of the road expansion. The investment is paid from previously collected taxes;
- The road expansion implies that less money is available for other Government projects;
- For your convenience, we computed the total investment in terms of eurocents per trip;
- You use the road for commuting and therefore would benefit from the road expansion;
- No road expansion implies that there is no investment of tax money and no travel time savings for you;
- The construction work will be carried out in the middle of the night, so you will not experience any nuisance from it.

	No road expansion	Road Expansion
Time savings, per trip	-	11 minutes
Investment of previously collected taxes, per trip	-	0.60 euro

FIGURE 3 Design of frame 3.

Frame 4: Citizen VoT in the context of a road expansion from which 100.000 people benefit

The value which an individual in her role as citizen places on travel time savings accruing from a transport project, may be affected by the number of people who experience these travel time savings. To test this expectation, we informed respondents to Frame 4 that they are one of the 100.000 people who use the expanded road for commuting ("You are one of the 100.000 people who use this road for commuting. The other travelers make the same number of trips as yourself."). Otherwise, Frame 4 is identical to Frame 3. This additional assumption also implies a modification of the choice task, but not of the values presented therein. In Frame 4 Respondents are presented with the following two attributes: "Time savings, per trip, for each of the 100.000 travelers (including yourself)" and "Investment of previously collected taxes, per trip, for each of the 100.000 travelers (including yourself)".

Frame 5: Citizen VoT in the context of a road expansion from which 100.000 people benefit, and is paid for by a onetime tax allocation

In this frame, the choice situation is converted into a onetime decision to allocate a particular sum of tax money per tax payer (rather than a hypothetical tax per trip made by the individual) in pursuit of travel time savings for 100.000 people including herself.

We ask you to think of the following situation:

The Government considers a road expansion aimed at reducing travel times.

We ask you whether you would choose for the road expansion, or not.

You can assume the following:

- The road expansion is financed out of tax money;
- **Total taxes do not increase** as a result of the road expansion. The investment is paid from previously collected taxes;
- The road expansion implies that less money is available for other Government projects;
- For your convenience, we recalculated the total investment to euros per Dutch tax payer;
- You use the road for commuting and therefore would benefit from the road expansion;
- No road expansion implies that there is no investment of tax money and no travel time savings for you;
- You are one of the 100.000 people who use this road for commuting. The other travelers make the same number of trips as yourself.
- The construction work will be carried out in the middle of the night, so you will not experience any nuisance from it.

	No road expansion	Road Expansion
Time savings, per trip, for each of the 100.000 travelers (including yourself)	-	11 minutes
Investment of previously collected taxes per Dutch tax payer (including yourself)	-	60 euro

FIGURE 4 Design of frame 5.

Frame 6: Citizen VoT in the context of a road expansion from which 100.000 people benefit, and is paid for by a onetime tax allocation from the individual's own previous tax payments

Frame 6 is identical to Frame 5 with the exception that in Frame 6, the respondent is asked to decide if she wants to allocate taxes which she herself has paid in the past, to the road expansion project. This additional assumption also implies a modification of the choice task. In Frame 6 respondents are presented with the following two attributes: "Time savings, per trip, for each of the 100.000 travelers (including yourself)" and "Investment of taxes previously paid by you".

Frame 7: Citizen VoT in the context of a road expansion from which 100.000 people benefit but she herself does not, and is paid for by a onetime tax allocation

In this frame, respondents were asked whether they would agree with a reassignment of tax money to a road expansion which does not affect their own commute, but from which 100.000 other travelers benefit in terms of travel time savings.

We ask you to think of the following situation:

The Government considers a road expansion aimed at reducing travel times.

We ask you whether you would choose for the road expansion, or not.

You can assume the following:

- Every day 100.000 people use this road for commuting;
- **Note:** You do **not** use the road yourself;
- The road expansion is financed out of tax money;
- **Total taxes do not increase** as a result of the road expansion. The investment is paid from previously collected taxes;
- The road expansion implies that less money is available for other Government projects;
- For your convenience, we recalculated the total investment to euros per Dutch tax payer;
- No road expansion implies that there is no investment of tax money and no travel time savings for the 100.000 people who use this road for commuting.

	No road expansion	Road Expansion
Time savings, per trip, for each of the 100.000 travelers	-	11 minutes
Investment of previously collected taxes per Dutch tax payer (including yourself)	-	60 euro

FIGURE 5 Design of frame 7.

Frame 8: Special case: Altruistic consumers

This frame is slightly special and a bit of an odd one out, compared to the previous seven frames: in this frame we asked a respondent whether she would be willing to pay a financial contribution from her after tax budget to facilitate a Government project (road expansion) from which 100.000 travelers, but not she herself, experience travel time savings.

We ask you to think of the following situation:

You are asked for a financial contribution for a road expansion which will lead to travel time savings.

We ask you whether you would choose for the road expansion, or not.

You can assume the following:

- Every day 100.000 people use this road for commuting;
- **Note:** You do **not** use the road yourself;
- No road expansion implies that there is no costs for you and no travel time savings for the 100.000 people who use this road for commuting.

	No road expansion	Road Expansion
Time savings, per trip, for each of the 100.000 travelers	-	11 minutes
Your financial contribution	-	60 euro

FIGURE 6 Design of frame 8.

3. Data collection

The questionnaire consisted out of four parts. Firstly, respondents were asked whether they commute by car for three or more days per week. Respondents who gave a negative answer to this question were excluded from the remainder of the experiment. Secondly, after reading through an introductory text, respondents were asked to

complete 16 choice situations. The choice situations were presented in random order across respondents, to prevent ordering effects. Since the text that precedes the choice tasks is of key importance for our study, we choose to repeat it for every single choice task for in case respondents wanted to re-read it. Thirdly, respondents were asked to provide some additional information concerning their usual commute. Fourthly, they were asked to evaluate the perceived ease and realism of the choice experiment and to report their evaluation of how effectively and efficiently the Government is spending tax payers' money. The survey company provided us with information about the socio-demographic characteristics of each respondent (income, age, gender, social class). Given the subtle nature of the framings, and also given that little guidance is available in the literature concerning the citizen frames, we choose to perform an extensive pretesting of our survey, which involved pilot experiments and focus groups where respondents were interviewed about their understanding and perception of the different frames, and were explicitly asked if particular frames made sense to them.

806 Respondents were recruited by the survey company, each of which was assigned to one of the eight frames in such a way that differences in socio-demographic characteristics between different frames were minimized. Our own analyses show that both the socio-demographic characteristics as well as the answers given by the respondents in the third and fourth part of the questionnaire did not differ substantially between the eight subsamples (see Table 1), and as such do not play a role in explaining found differences in VoT between frames.

TABLE 1 Socio-demographics and answers to third and fourth part of questionnaire per context

	1	2	3	4	5	6	7	8
Average commute time	32.88	30.22	32.42	32.60	32.93	33.38	41.63	30.83
Number of days travelling by car per week	4.51	4.53	4.59	4.45	4.46	4.60	4.48	4.48
I was convinced of my choices (0 = strongly agree, 4 = strongly disagree)	0.51	0.67	0.83	0.84	0.69	0.81	0.82	0.50
I found it difficult to trade-off the attributes (0 = strongly agree, 4 = strongly disagree)	2.67	2.78	2.23	2.13	2.36	2.20	2.24	2.68
I thought that the questionnaire was realistic (0 = strongly agree, 4 = strongly disagree)	2.07	2.08	1.96	1.67	1.49	1.53	1.55	2.22
I think that the government wastes taxpayers money (0 = strongly agree, 4 = strongly disagree)	2.51	2.64	2.43	2.02	2.10	2.26	2.20	2.66
I would like to receive the results of this study (0 = no, 1 = yes)	0.54	0.59	0.61	0.55	0.45	0.50	0.46	0.63
Age	43.03	43.75	44.05	42.65	42.67	41.58	41.41	43.06
Gender (1 = male, 2 = female)	1.23	1.29	1.24	1.29	1.31	1.27	1.31	1.36
Education (1 = primary school, 7 = academic)	4.81	4.41	4.60	4.69	4.74	4.50	4.67	4.44

Attribute levels were selected as follows: for the first four frames which expressed costs and travel time savings on a per trip base, we choose the following four time gain levels (2, 5, 8, and 11 minutes) and cost levels (0.20, 0.60, 1.00 and 1.40 euro); these were selected to be in line with time gains and costs presented in previous SC-experiments held in Northwest European countries. The attributes for the lumpsum reallocation of tax money (Frames 5 through 8) were selected in a way which ensures maximum consistency (in terms of the implied Net Present Value) with the per trip-costs of the frames 1 through 4. To illustrate, 1 euro per trip equals an NPV of 954,79 million euros assuming a discount rate of 5.5%, a time horizon of 100 years (both assumptions are standard practice in the Netherlands, see Dutch Ministry of Infrastructure and the Environment (2012) and assuming that each traveler makes 500 commuting trips (i.e.,

250 trips to work, and 250 return trips) each year. Consequently, assuming that 10 million people (out of a population of about 17 million) pay tax in the Netherlands, the corresponding lumpsum payment should be 95,48 euro per tax payer, and we rounded this to 100 euro. Hence, to resemble the per trip cost levels used in Frame 1-4, of 0.20, 0.60, 1.00 and 1.40 euro, lumpsum cost levels of 20 euro, 60 euro, 100 euro and 140 euro per tax payer were used in Frames 5-8. In terms of experimental design, an orthogonal design was chosen which supports efficient testing of all main effects, leading to 16 choice tasks per participant. Respondents were evenly distributed across frames. After removing missing values, 12286 cases were obtained, from 806 individuals. Biogeme software (Bierlaire, 2003) was used to estimate the discrete choice models from which VoTs were derived.

4. Results

Table 1 presents, per frame, its main distinguishing characteristics, the ASC for the quicker and more expensive alternative (which could either take the form of an existing route, or a road expansion project), and the VoT. Note that we estimated Panel Mixed Logit models, allowing the ASC and VoT to vary randomly (governed by a Normal distribution) across individuals but not across choices made by the same individual. This was implemented as follows: all observations (for Frames 1-8) were pooled together in one dataset. For each frame, a specific ASC and VoT were estimated. In addition, generic standard deviations for the ASC and VoT were estimated for frame 1-4 and for frame 5-8 respectively. This distinction was made in recognition of the fact that frames 1-4 are qualitatively different from frames 5-8, the latter ones referring to a single, onetime lumpsum investment rather than a recurring payment per trip. Seven hundred Halton draws were used for evaluating the four-dimensional integral; extensive experimentation with different numbers of draws showed that parameter estimates and model fit were practically similar to the estimates obtained for lower numbers of draws.

The model's Null-LogLikelihood (based on 12268 cases from a total of 806 individuals) = -8504. Final LogLikelihood for a simple MNL-model = -7012, implying a rho-squared of 0.175. Allowing for random heterogeneity as discussed above lead to a final LogLikelihood of -4404 (rho squared = 0.482), which signals that unobserved heterogeneity plays a very important role in our data. This is also reflected in the significance and size of the estimated standard deviations of random variables: the standard deviation for the ASC for frames 1-4 equals 1.97 (robust t-ratio = 13.51); the standard deviation for the ASC for frames 5-8 equals 4.26 (robust t-ratio = 12.98); the standard deviation for the VoT for frames 1-4 equals 10.3 (robust t-ratio = 8.33); the standard deviation for the VoT for frames 5-8 equals 8.44 (robust t-ratio = 11.18).

TABLE 2 Key Results per Frame and Description of Characteristics

Frame	1	2	3	4		5	6	7	8
Route choice / road expansion	Route choice	Road expansion	Road expansion	Road expansion		Road expansion	Road expansion	Road expansion	Road expansion
After tax budget / tax	After tax budget	After tax budget	Tax money	Tax money		Tax money	Tax money ('own' taxes)	Tax money	After tax budget
Mentioning of benefits to other users	No	No	No	Yes		Yes	Yes	Yes	Yes
Payment per trip / lumpsum	Per trip	Per trip	Per trip	Per trip		Lumpsum	Lumpsum	Lumpsum	Lumpsum
User / non-user	User	User	User	User		User	User	Non-User	Non-User
ASC for fast and expensive alternative	-2,44	-2,46	-1,82	-1,15		-1,75	-1,32	-2,81	-4,71
St error ASC	0,365	0,334	0,351	0,261		0,477	0,453	0,549	0,744
VoT (euro/hr)	8,82	8,82	11,4	17,22		966	1200	894	356,4
St error VoT	1.53	1.15	1.43	3.19		101.4	116.4	84.6	68.4
BetaTC (ct)	-0,0251	-0,0199	-0,0285	-0,0088		-0,0466	-0,0339	-0,0431	-0,0534
BetaTT (min)	-0,369	-0,2925	-0,5415	-0,2511		-0,7503	-0,678	-0,6422	-0,3172

Given the qualitative differences in terms of how the cost attribute is operationalized in Frames 1-4 compared to Frames 5-8, we interpret the results of Frame 1-4 and Frame 5-8 separately. The most important conclusions concerning Frames 1-4 VoT are:

- Frame 1 VoT, which is the benchmark against which other frames' VoTs are compared, closely resembles the VoT of 9.25 euro per hour found in the Dutch national VoT study by Kouwenhoven et al. (2014). This lends credibility to our results.
- A striking result is that Frame 1 VoT precisely matches Frame 2 VoT. Apparently, travel time savings derived from a pure consumer choice setting between two routes are valued equally as travel time savings obtained from a referendum question involving a road expansion project by the Government.
- Frame 3 VoT is 2.60 euro/hr higher than Frame 1 and 2 VoT. However, this difference is non-significant (t-ratio = 1.22) which implies that we cannot conclude that individuals value travel time savings differently when the travel time savings are financed out of tax payers money compared with the situation where they are financed from their own after tax income.

- Frame 4 VoT is significantly higher than Frame 1, 2 and 3 VoTs (t-ratios are 2.42, 2.57, and 1.66, respectively). The latter t-ratio implying a significance at a 95% level under one-sided testing, which is appropriate in this case, given our strong a priori expectations), which is in line with our *a priori* expectation that respondents would attach more value to travel time savings accruing from a transport project, when it is made clear that many others will benefit from the time gains as well.

The most important conclusions concerning Frames 5-8 VoT are:

- Frame 6 VoT is higher than the Frame 5 VoT, but not significantly so (t-ratio = 1.60). So, we cannot conclude that highlighting that taxes used for the road expansion were previously paid by the respondent herself, changes her VoT.
- A striking result is that Frame 7 VoT closely resembles Frame 5 VoT (t-ratio of the difference = 0.56). This result suggests that people believe that around 900 euro per tax payer should be allocated to a transport project for every one hour travel time savings for 100.000 people, irrespective of whether or not they themselves are one of the people reaping the time gains.
- Frame 8 VoT is significantly lower than Frame 7 VoT (t-ratio = 4.89), which implies that respondents value travel time savings accruing to other people than themselves higher when the transport project is financed using tax money, compared to when it is financed using their own after tax income. Hence, individuals have different preference orderings in their role as 'consumer' and 'citizen' when valuing travel time savings for other people.
- Based on Frame 7 and Frame 8 it can be concluded that the value of travel time gains accruing to others than oneself is significantly larger than zero, irrespective of whether tax money or personal income is involved. This finding is in line with results reported in previous work that people can assign value to transport infrastructure even if they don't benefit from it themselves (e.g. Laird et al., 2009; Manville and Cummins, 2015). Manville and Cummins (2015) found that many non-transit users in the United States were willing to pay additional taxes in support of a public transport system, for reasons of broader societal and environmental concerns.

5. Conclusions and discussion

The analyses presented in this paper serve to provide an empirical footing underneath a hitherto largely normative debate concerning which valuation of non-market goods (such as travel time) to use for the evaluation of (transport) policies. Previous studies have criticized the 'consumer sovereignty' paradigm implicitly adopted in most Stated Choice experiments. In these experiments, respondents are typically asked to make a series of hypothetical travel choices as if they were paying travel costs from their own budget (whereas projects are paid by taxes), and as if the travel time is only experienced by themselves (as opposed to being experienced by all travelers using a particular travel option). Many scholars have argued that the valuation of non-market goods derived from such experiments cannot or should not serve to inform policy-making, as they are a poor proxy of how respondents believe that Government should spend tax money in pursuit of travel time gains for potentially very large numbers of travelers. Rather than taking a stand in this normative debate, we in this paper choose to put some of its most important premises to the test empirically, in the context of the most prominently featuring non-market good in Transportation: travel time. We did so by designing a SC-experiment with different frames, some representing the conventional consumer-perspective, others gradually approaching a so-called citizen perspective. Obtained results allow us to draw a number of relevant conclusions.

5.1. Conclusions

A first important conclusion of this study is that we did not find a significant difference between the VoT of i) individuals who were asked whether they would choose a faster route for which they would pay more from their after tax income, and ii) individuals who were asked whether they supported the allocation of previously collected tax money to a road expansion by the Government which decreases their travel time. Hence, we found

no proof, statistically speaking, for the often used normative argument that preferences of individuals in their role as consumers (concerning how they should spend their resources) are likely to be a poor proxy for the preferences of individuals in their role as citizens (concerning how Government should spend its resources). A second important conclusion is that individuals assign more value to travel time savings accruing from an infrastructure project financed by previously collected taxes when they are made aware of the fact that 100.000 travelers would benefit from the project, compared to the situation where the individual receives no explicit information about whether (and if so, how many) other people would benefit from the project besides herself. This finding adds a subtle nuance to the above discussion, in the sense that there does appear to be a difference between the VoT expressed by an individual who is put in a purely 'selfish' consumer frame, compared to one who is put in a more 'altruistic' citizen frame. A third important conclusion is that individuals who were framed as beneficiaries and individuals who were framed as non-beneficiaries assign the same value to travel time savings accruing from a Government project which is financed out of previously collected taxes. Hence, the value that individuals in their role as citizen assign to travel time savings accruing from a Government project appears not to be influenced by whether or not they themselves benefit from the project. In combination, these conclusions lead to a number of implications for scholars and policy-makers.

5.2. Implications

First, the fact that we did not find a significant difference between how individuals 'spend' their own income versus previously collected tax money, can be taken as empirical evidence that the classical consumer VoT is a good proxy for citizen VoT, strengthening its position as the single relevant appraisal method. Note that an interesting avenue for further research would be to explore the transferability of our conclusions towards other non-market goods that play an important role in transport policy evaluation, such as safety and recreational opportunities.

A counterargument from people supporting the citizens' perspective on evaluating transport projects is that the citizens' VoT is still 2,60 euros per hour higher than the classical VoT and that this difference, even if not being significant, can have non-trivial implications for CBA scores. A middle position might be to assess the travel time savings of transport projects with both metrics. Or perhaps, the results derived from the consumer VoT experiment may be relevant information for politicians with a neo-liberal worldview who see citizens as 'clients of the Government', whereas results derived from the citizen VoT experiment are relevant for politicians who are more interested in the way individuals in their role as citizen value travel time savings accruing from transport projects. Moreover, it seems very worthwhile to replicate this study (both inside and outside The Netherlands) with more respondents, to see whether this will lead to significant differences.

Second, an outcome of this study which is – in our view – highly relevant for practical applications is that the average respondent to our study believes that a lumpsum amount of around 900 euro per tax payer may be allocated to a transport project per hour of travel time savings for 100.000 people, irrespective of whether they are one of the 100.000 people grasping the time savings or when 100.000 other people experience the time savings. At the aggregate level of Dutch society, roughly speaking, we would thus find a willingness of citizens to assign 150 million euros of previously collected taxes to a typical Government project from which 100.000 individuals derive 1 minute of travel time savings per trip.² We believe that when armed with such empirical results, validated and broadened in future empirical studies, policy makers may comfortably derive how much tax money to spend on a project which leads to a certain travel time saving for a certain number of citizens.

² Note that only individuals who travel to work by car at least three times a week were included in our sample. This leads of course to bias. Further research is needed to determine which amount of money citizen are willing to assign to travel time savings accruing to transport projects.

Due to the explorative character of our study the above conclusions and implications should be considered building blocks for a fruitful academic discussion, rather than definitive statements, set in stone. The most fundamental discussion that we are hoping to fuel with the empirical results of this study is whether or not the conventional consumer VoT is the single most relevant metric for the valuation of travel time savings in the appraisal of transport projects. Once again we wish to emphasize here, that in this paper we adopt an empirical standpoint, and refrain from arguing which perspective (consumer versus citizen) should be used.

6. References

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