



# Altruist talk may (also) be cheap: Revealed versus stated altruism as a predictor in stated preference studies

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## **Altruist talk may (also) be cheap: Revealed versus stated altruism as a predictor in stated preference studies**

### **Abstract:**

Altruistic preferences of various forms may cause difficulties in welfare economics. In the valuation of public goods, such preferences are believed to help explain the substantial non-use values found in many stated preference (SP) valuation surveys. However, studies analysing the effect of altruism on willingness to pay (WTP) have underappreciated the challenges in measuring altruism by the stated measures typically used. Instead, we exploit a naturally occurring decision domain to investigate the role of altruism in SP. We make use of an Internet survey company's data on respondents' donations of earned survey coins to charities to analyse the effect of donation behaviour on WTP across two contingent valuation (CV) surveys on different environmental topics. Hence, donors in our data are proven givers of their own money in an anonymous and unrelated setting, a decision much like the anonymous dictator game with earned resources. We find that respondents' past donations are associated with higher WTP in the CV surveys, also when controlling for stated altruism, ecological and environmental attitudes, and respondent characteristics. The strong association between past donations and higher WTP imply that altruism is an even more important factor in explaining the substantial non-use values found in SP than assumed. The results also support prior research finding altruistic behaviour in one decision domain to be a good predictor of altruistic behaviour in other domains. Combining past behaviour with preference elicitation opens new avenues of research to better understand and handle altruistic preferences in SP and welfare economics.

**Keywords:** Prosocial behaviour, altruism, contingent valuation, donations, willingness to pay

**JEL classification:** Q51, Q53, Q54, Q57

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## Sammendrag

Altruistiske preferanser kan lede til teoretiske og praktiske utfordringer innen velferdsøkonomi. Blant annet trekkes altruisme fram som en mulig forklaring på betydelige ikke-bruksverdier kartlagt i mange verdsettingsstudier. Tidligere studier av altruismes effekt på betalingsvillighet kan ha undervurdert utfordringene ved å måle altruisme gjennom selvrapporing. Vi anvender informasjon om tidligere altruistisk adferd for å undersøke effekten av altruisme i verdsettingsstudier. Vi bruker data fra to verdsettingstudier av ulike miljøgoder for å se på sammenhengen mellom respondenters tidligere donasjoner til veldedige organisasjoner og betalingsvillighet. En andel av respondentene i begge studier er dokumenterte givere i en urelatert og anonym beslutningssituasjon som ligner et anonymt diktatorspill med opptjente midler til fordeling. Vi finner at respondenter som er dokumenterte givere har høyere betalingsvillighet i begge verdsettingsstudiene, også når vi kontrollerer for selvrapportert altruisme, holdninger til bruk av natur og klimabevissthet, samt respondentens inntekt, kjønn, utdanning og alder. Den klare sammenhengen mellom tidligere donasjoner og økt betalingsvillighet i verdsettingsstudiene tilsier at altruisme er en enda viktigere forklaring på de betydelige ikke-bruksverdiene kartlagt i verdsettingsstudier enn tidligere antatt. Resultatene støtter også forskning som har funnet at altruistisk adferd i én kontekst er en god prediktor for altruistisk adferd i andre kontekster. Ved å kombinere tidligere giveradferd med verdsettingsstudier åpnes nye muligheter for forskning på betydning og håndtering av altruistiske preferanser innen betalingsvillighetstudier og velferdsøkonomi.

# 1 Introduction

Altruistic preferences shape prosocial behaviour across decision domains and affect outcomes in e.g. markets, charities, and elections (Bolsen et al. 2014; De Oliveira et al. 2011). Prosocial behaviour is people's actions that benefit other people or society as a whole and are motivated by people's social preferences, for instance altruistic, reciprocal, and other purposes. We interpret altruistic preferences as individuals' desire to help others without expecting reward from the recipient or from others (Bartal 1986). Altruism might cause people to donate money to charities or helping known and unknown people in any manner, while reciprocity promotes social norms, through encouraging hard-working colleagues or sanctioning free riders.<sup>1</sup> Although prosocial behaviour alleviates collective action problems in real-life, altruistic preferences cause theoretical difficulties in welfare economics and cost-benefit analysis (Bergstrom and Cornes 1983; Flores 2002; Bergstrom 2006).<sup>2</sup> This paper investigates altruistic preferences motivating prosocial behaviour across decision domains and uses past donation behaviour as an indicator of altruistic preferences when analysing willingness to pay (WTP) for environmental goods in contingent valuation (CV) surveys. Our measure of altruistic prosocial behaviour captures both pure altruistic motives and egoistic "warm glow of giving" following the framework of Andreoni (1989).<sup>3</sup> We believe the measure minimises confounding motives for prosocial behaviour such as reciprocity, third party compensation, signalling and social desirability bias.

Standard classification of the total economic value of environmental goods includes benefits from the use/consumption and benefits from the mere existence of the environmental goods (nonuse values). Individuals attach nonuse values to environmental goods for different reasons, including altruism toward others and future generations. Stated preference (SP) methods can capture both use and nonuse values and have become increasingly important in shaping public policies. The validity of SP has been criticised, often due to the handling of altruistic preferences. One argument is that respondents' altruistic preferences contribute to upward hypothetical bias in incentive incompatible surveys

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<sup>1</sup> Reciprocal preferences is when individuals want to respond to actions perceived to be kind in a kind manner, and to actions perceived to be hostile in a hostile manner (Fehr and Schmith 2006).

<sup>2</sup> Whether to include prosocial preferences in cost-benefit analysis has been much discussed in welfare economics (Flores 2002). Bergstrom and Cornes (1983) argue that cost-benefit analysis should only take self-regarding egoistic preferences into account since the gains each person obtains from other's enjoyment of shared public goods are balanced by the sympathetic losses each bears from the share of its cost paid by the others. Flores (2002) showed that for larger discrete changes in public goods, efficient policies depend on distribution of benefits and costs and must take prosocial preferences into account. Bergstrom (2006) point out that pure altruism should not increase WTP for the public good in SP.

<sup>3</sup> Andreoni (1989) terms prosocial behaviour entirely motivated by the concern for others as pure altruism, prosocial behaviour entirely motivated from *the warm glow* of giving pure egoism, while prosocial behaviour motivated by both altruism and egoism, he terms impure altruism.

(Vossler and Zawojka 2020; Hausman 2012; Kling et al. 2012; Murphy et al. 2005; Loomis 2014).<sup>4</sup> Another claim is that respondents' warm glow feelings from stating high WTP bias results (Bishop 2018). The research literature has analysed the effect of altruism on WTP and hypothetical bias, focusing on the validity and reliability of the WTP measure, while the reliability of the applied self-reported altruism measures has not been studied in detail to our knowledge. Since altruism is an important factor when explaining substantial non-use values (Bouma and Koetse 2019), altruism is also important in shaping public policies based on SP valuations. A more thorough understanding of how altruistic preferences affect SP valuations could have important research and policy implications.

Ekström (2018), unrelated to SP, analyses seasonal variations in altruism using reverse vending machine donation data. When customers recycle their cans and bottles, they can choose whether to keep the money or donate it to a charity organisation concerned with foreign aid. Ekström (2018) points to several reasons why this decision problem is suitable for studying altruistic preferences: Monetary incentives for giving are absent, there is no reciprocal motive between the donator and the charity, and solicitation is typically impersonal and anonymous. We analyse altruism using data from a similar decision problem; a survey company's data on enrolled Internet panel respondents' donation of earned survey coins to charities. By answering questions in regular online surveys, respondents earn coins they may use freely on either private consumption of goods or donations to charities in an online survey shop. As in Ekström (2018), the decision problem involves an anonymous and impersonal choice between self and others with no expectation of monetary or nonmonetary compensation in return.

Our decision problem also resembles the nonstrategic decision situation in dictator games.<sup>5</sup> Anonymous pay-off maximising respondents are expected to keep the whole endowment for themselves (Franzen and Pointner 2012) but observed behaviour in laboratory experiments rejects this expectation; many subjects exhibit prosocial behaviour.<sup>6</sup> Bekkers (2007) compares survey coins donation decisions to dictator games and confirms close similarities in results and donator characteristics. In line with laboratory experiments, about 6 percent of the survey respondents donated their money, and donations increase with age, education, income, trust, and prosocial value orientation

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<sup>4</sup> Hypothetical bias problems have led to several important methodological developments and updated guidelines (Johnston et al. 2017; Kling et al. 2012).

<sup>5</sup> The dictator game is a one-shot decision game in which an endowment is assigned to two players, and one of them, the dictator, distributes the amount between them, while the recipient simply must accept the allocation.

<sup>6</sup> Engel (2011) conducts a meta-study and finds on average 28 percent of the coins allocated to the recipient, and that the amount allocated depends on various conditions. For example, donations are reduced when dictator endowment is earned through tasks, the dictators' age increase donations and deserving recipients gets more donations (Engel 2011).

as found in dictator games (Bekkers 2007). Experiments indicate that subjects are less inclined to donate when they first earn their endowments through tasks and when anonymity is convincingly implemented (Franzen and Pointner 2012). Respondents in our study both earn their money by answering surveys and make an impersonal and anonymous donation decision, which should suggest strong altruistic preferences among our donors.

Although several studies find that self-reported altruism is an important determinant of WTP in CV studies (Nunes and Schokkaert 2003; Clark and Friesen 2008; Nunes et al. 2009; Nielsen and Kjær 2011; Kotchen 2015; Ma and Burton 2016; Bouma and Koetse 2019), all former studies of altruism, to our knowledge, use Likert scale survey statements trying to capture aspects of altruism.<sup>7</sup> Such altruism statements may capture certain altruistic preferences (Hartmann et al. 2017), but the measures could be biased and blurred by idealised personality bias<sup>8</sup> (Carpenter 2002) and the subjectiveness of self-reporting.

Carpenter and Myers (2010) argue that an incentivised dictator game is the best indicator of altruism since self-reported survey measures may be susceptible to idealised personality bias in which a respondent projects the person that he would like to be (Carpenter 2002). Others, such as Falk et al. (2016) and Carpenter (2018), employ the incentivised dictator game with a charitable organisation as the recipient as the standard to develop and test altruism survey questions. Carpenter (2018) finds varying predictive power of the self-reported altruism measures used in literature.

Individuals' altruistic behaviour across decision domains has previously been studied through comparisons of laboratory and field experiments (e.g. Franzen and Pointner 2013; De Oliveira et al. 2011; Carpenter and Myers 2010; Galizzi and Navarro-Martinez 2018; Landry et al. 2010; Yeomans and Al-Ubaydli 2018), while Bolsen et al. (2014) examine prosocial behaviour across two field settings, comparing voter turnout and water saving during drought. De Oliveira et al. (2011) identify "giving types" through an experiment where participants can donate to multiple charitable organisations, and find that individuals who give to one organisation, give significantly more to other (unrelated) organisations. They find, interestingly, that giving decisions are not explained by observable individual characteristics but rather by latent preferences for giving. Others, such as

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<sup>7</sup> E.g. statements such as "There are some funding campaigns to which my family and I feel very close to and therefore we do not hesitate to contribute a donation" or "It is difficult for me to decline my help to other individuals who, either in the streets or at my door, beg for charity". Examples from Nunes and Schokkaert (2003).

<sup>8</sup> Respondents reporting how they want to perceive themselves.

Galizzi and Navarro-Martinez (2018), find lacking correspondence in altruistic behaviour across different settings. Galizzi and Navarro-Martinez (2018) do not find persistent altruistic behaviour across social preference games, field situations where they tap into different types of prosocial behaviours related to giving money and helping others, and self-reported measures of various altruistic tendencies shown in the past.

Following De Oliveira (2011), Carpenter and Myers (2010) and Franzen and Pointner (2013), we use past donation behaviour as an explanatory variable to estimate the effect of altruistic preferences on WTP in SP. We examine the association between individuals' past donations of their survey coins and the stated WTP of the same individuals in two (unrelated) CV surveys with different respondents: (1) coastal ecosystem service protection from oil spill damages, and (2) impacts of climate forest planting. In the latter survey, we also elicit respondents' altruistic, ecological, and environmental attitudes. Data sets from both surveys are merged with data on respondents' past donations of earned survey coins from the survey company.

The remainder of this paper proceeds as follows. Section 2 provides a conceptual framework and hypotheses, Sections 3 and 4 present the study design and empirical results. Section 5 discusses the results and concludes.

## 2. Conceptual framework and hypotheses

Following Lusk and Norwood (2009) and Carlsson et al. (2018), we assume an indirect utility function which is additively separable between consumption and altruistic preferences:

$$U = v(G, M) + I(v^{-i}(G, M^{-i}), g), \quad (1)$$

where  $v$  represents an indirect utility function of a public good  $G$  and own income  $M$ . The second part  $I(\cdot)$ , is an altruistic component of the utility function, depending on altruistic preferences towards others' utility  $v^{-i}$  as a function of the public good  $G$  and others' income  $M^{-i}$ , and warm-glow utility of contributing  $g$ . We assume positive and diminishing marginal utility, and derive the marginal WTP for an exogenous change in the public good as follows:

$$MWTP = \frac{\frac{\partial U}{\partial G}}{\frac{\partial U}{\partial M}} = \frac{\frac{\partial v}{\partial G} + \frac{\partial I}{\partial v^{-i}} \frac{\partial v^{-i}}{\partial G}}{\frac{\partial v}{\partial M}} \quad (2)$$

If  $\frac{\partial v}{\partial G} > 0$  the individual gets utility from the public good. If  $\frac{\partial I}{\partial v^{-i}} > 0$  the individual gets utility from others' utility, which is like pure altruism in Andreoni's (1990) framework. If  $\frac{\partial I}{\partial g} > 0$ , the individual gets utility by paying WTP for the public good per se, much like the warm glow of giving in Andreoni's (1990) framework.

Our first hypothesis is that past donations predict higher stated WTP in CV surveys when controlling for individual characteristics. This hypothesis implies that a "giving type"-respondent is increasing the WTP for environmental goods across the two CV surveys.

Our second hypothesis is that past donations are significantly and positively associated with WTP also when controlling for self-reported altruism as well as other attitudes and individual characteristics. The hypothesis implies uncovering new information on the importance and role of altruism not picked up by self-reported altruism measures in SP surveys.

### 3. The data

Data were collected in two CV surveys, which both were coupled with information on how individual respondents spent their earned survey coins.

#### 3.1 The donation data

The data on survey points earned, historical survey coin spending behaviour and Internet panel background information were made available from the survey company NORSTAT. The system for awarding and spending survey coins has evolved somewhat within the survey industry. Within the NORSTAT system, a minute of stipulated time spent answering surveys is normally awarded NOK 1 (equal to about 0.1 Euros). Respondents can normally spend the money whenever they want (from the first coin earned) in an online shop, offering different private consumption options or donations to various types of charity organisations.

In the first survey on protection from oil spill damages, there was some limitations due to confidentiality rules, and we were only given summary data for each respondent on the overall use of survey coins throughout the panel membership and the option the respondent had chosen most

frequently. The categories provided to us were private consumption in the form of gift cards (typically used for private consumption), cinema tickets or lottery tickets, or various types of donations termed “general” or for a specific voluntary organisation conducting various community tasks for free (e.g. supporting the elderly). The oil spill study contained 4846 respondents who have completed our survey answering our CV payment card question. For a significant share of the respondents (38 percent) we have no data since they by the time of the CV survey had not yet decided on how to spend their survey coins. Hence, these are removed from the sample, leaving 2461 unique respondents of which 12 percent donated their coins to a charity of some kind.

In the second survey on impacts of climate forest planting, we have data on respondents’ use of survey money during the last five years (2014 to 2018). Respondents spent their coins in a similar survey shop as the one described above, offering a range of products and gift cards, or they donated their coins to various types of charities.<sup>9</sup> Our data set contained 731 respondents who had completed the survey answering our CV payment card question.<sup>10</sup> Of these, 615 respondents had decided how to spend the coins obtained by the survey company, while we have no data on the remaining 116 respondents since they by the time of the CV survey had not yet decided on how to spend their survey coins. About 13 percent of the 615 respondents donated their coins to a charity at least once. The shares of donating survey respondents are somewhat higher than in Bekkers (2007) who explores earned survey coin donation decisions and finds that 6 percent of respondents chose to donate their earnings to charities in their panel. See Table 1 for an overview of our donation decision data sets.

**Table 1 – Descriptive statistics of donations made by respondents**

	Period	Donating respondents	Percent of respondents	No. of respondents
<b>Study 1 - Oil spill protection</b>	2013	289	12.0 %	2461
<b>Study 2 - Climate forest impacts</b>	2014-2018	78	12.7 %	615

<sup>9</sup> E.g. SOS Children Villages, Amnesty International, Red Cross, WWF, Doctors without borders and Save the Children.  
<sup>10</sup> We removed 120 protest answers. Removed answers are respondents that believe tax levels are already high enough, believe it is not right to trade-off nature and money and will not pay before price is known. The removal of their responses does not affect our chosen measures. We also removed 160 responses where people answer “Don’t know” to the WTP question. Removing these respondents do not change our findings.

**Table 2 – Descriptive statistics of respondent characteristics in the data sets**

		Donating respondents		Not donating respondents		Difference in means between groups	
		Mean	N	Mean	N		
<b>Study 1 - Oil spill protection</b>	Age	49.9	289	44.5	2127	5.04***	
	Male	43 %	289	49 %	2127	- 6 %*	
	Married	67 %	284	64 %	2107	- 3 %	
	Household size	2.39	289	2.45	2113	- 0.06	
	Higher education	59 %	289	58 %	2127	1 %	
	Household income	737 644	289	689 882	2127	47 762*	
<b>Study 2 - Climate forest impacts</b>	Age	58.8	78	53.5	537	5.37**	
	Male	46 %	78	50 %	537	- 4 %	
	Married	50 %	78	51 %	537	- 1 %	
	Household size	2.08	78	2.31	537	-0.23	
	Higher education	65 %	78	66 %	537	- 1 %	
	Household income	700 256	62	745 982	448	- 45 982	
	<i>Interested in:</i>						
	Charitable work	56%	78	36%	537	20 %***	
	History and culture	58%	78	53%	537	5 %	
	Food and wine	51%	78	56%	537	- 5 %	
	Politics	51%	78	51%	537	0 %	
	Economy	31%	78	48%	537	- 17 %**	
	Outdoor recreation	33%	78	36%	537	- 3 %	

Note: Note: \*p<0.10, \*\*p<0.05, \*\*\*p<0.01. Two sampled t-test with unequal variances. Higher education is defined as holding a bachelor, master or PhD degree from a university or a college.

In a meta-study of donation decision in dictator games, Engel (2011) finds that older people often donate more than others, students donate less, while women donate more. The respondents who have donated at least once in our data set are significantly older than other respondents, but do not differ much in terms of gender, household type and size, and education level. Table 2 describes socio-demographic characteristics of donating and non-donating respondents.

De Oliveira et al. (2011) find that no observable socio-demographic variable is significantly related to a latent generosity index constructed through factor analysis. They argue that this is due to the existence of “a giving type” and that their index contains new information not available using observable characteristics.

As in De Oliveira et al. (2011), there are no considerable differences in socio-demographic characteristics between our donating and non-donating respondents across our two studies. Age is the only consistent substantial difference between the groups, where donating respondents in both studies are on average about five years older than other respondents.

Rather interesting, we find larger differences when comparing the stated interests between groups in Study 2 on climate forest impacts. We find that donating respondents are a lot more interested in charitable work and a lot less interested in the economy than the non-donators in the same study. A stronger interest in charitable work may indicate that donators are more interested in prosocial behaviour than other respondents. Less interest in the economy could indicate less interest in business, consumption, and money, and thus could possibly imply a lower marginal utility of money among donating respondents than among other respondents. We also note that donating respondents are about as interested in politics as other respondents.

### **3.2 CV survey on coastal ecosystem service protection from oil spill damages**

The topic of the first CV survey was people's WTP to avoid environmental damages from oil spills at four different sites along the Norwegian coast. The survey, conducted in 2013, built on the experiences from previous CV surveys of major marine oil spills; especially Carson et al. (1992; 2003) of the Exxon Valdez oil spill in Alaska (basis for much of the methodological discussions of CV that followed<sup>11</sup>) and Loureiro et al. (2006) of the Prestige oil spill in Spain in 2002. The aim was to establish a set of unit values for a range of ecosystem service damages from oil spills for use in cost-benefit analysis (CBA) of measures conducted by the Norwegian Coastal Administration preventing oil spills from ships.

After thorough testing in focus groups, one-to-one interviews and piloting, the survey was conducted by a professional survey firm (NORSTAT), which generated random samples of respondents from their pre-recruited, high quality internet panel for three regional samples and for one national sample (asked about damages outside Lofoten Islands, a nationally important site). We obtained a sample of 4846 complete responses, with a response rate of ca. 18-20 percent across the subsamples.

Each respondent received four CV scenarios (from small loss to very large loss of coastal ecosystem services), where preventive measures could avoid all damages from an oil spill in the next few years and leave the environment at the present conditions (Figure 1). Damages were described in the four categories of damage to birds, damage to seals, damage to the coastal zone and damages to other marine life. Damages were assessed using expert knowledge, and the descriptions were

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<sup>11</sup> The result of which was a set of guidelines for CV studies by the National Oceanic and Atmospheric Administration's so-called Blue Ribbon Panel on contingent valuation (Arrow et al. 1993).

slightly different for each of the four oil spill sites included (two on the west coast, one in the Oslo fjord and one off the iconic Lofoten Islands in the north).

**Figure 1 - Damage/loss table used in the Contingent Valuation (CV) survey to describe four different environmental loss levels for an oil spill (example from the Oslo fjord area)**

	With measures	Without measures			
	Present conditions	Small loss	Medium loss	Large loss	Very large loss
Damage to birds					
	The area is an important breeding, migration and wintering ground for seabirds. The bird populations are in good condition.	The bird populations are in good condition.  In total <b>1000</b> dead birds	The bird populations recover after <b>1</b> year  In total <b>7 500</b> dead birds	The population of common eider is locally endangered. Other bird populations recover after <b>2</b> years  In total <b>20 000</b> dead birds	The common eider and common murre populations are locally endangered. Other bird populations recover after <b>4</b> years.  In total <b>50 000</b> dead birds
Damage to seals					
	Parts of the area are important to seals. The seal population is in good condition	The seal population is in good condition  In total <b>10</b> dead seals	The seal population is in good condition  In total <b>40</b> dead seals	The population of harbor seal recovers after 2 years  In total <b>150</b> dead seals	The population of harbor seal is locally endangered  In total <b>300</b> dead seals
Damage to coastal zone					
	The area is very important for recreation and outdoor life  The area has a large cold-water coral reef, rich marine eelgrass meadows and a valuable natural environment	<b>5</b> km of coastal zone consisting of <i>bare rock shores and beaches</i> soiled with oil  Affects land and water based outdoor life  Affected areas can be used as normal after <b>6</b> months	<b>30</b> km of coastal zone consisting of <i>bare rock shores and beaches</i> soiled with oil  Affects land and water based outdoor life  Affected areas can be used as normal after <b>1</b> year	<b>150</b> km of coastal zone consisting of <i>bare rock shores and beaches</i> soiled with oil  Affects land and water based outdoor life  Affected areas can be used as normal after <b>3</b> years	<b>400</b> km of coastal zone consisting of <i>bare rock shores and beaches</i> soiled with oil  Affects land and water based outdoor life  Affected areas can be used as normal after <b>5</b> years
Damage to other marine life					
	Fish and shellfish in the area	Can be harvested as before. Safe to eat seafood  Spawning areas for fish are unaffected	Can be harvested as before. Safe to eat seafood after <b>1</b> year  Spawning areas for fish are unaffected	Fish, shellfish, mussels and seaweed should not be eaten until <b>3</b> years after the spill  Spawning areas for fish are unaffected	Fish, shellfish, mussels and seaweed should not be eaten until <b>5</b> years after the spill  Spawning areas for fish are unaffected

Validity checks common in CV studies confirmed rational, valid responses (e.g. clear sensitivity of WTP with higher damage levels). The subsamples were representative of the regional/national population with regards to selected socio-demographic characteristics (i.e. age, gender and education level). A detailed description of the survey questionnaire and other aspects of the survey are given in

Navrud et al. (2017) and Lindhjem et al. (2014). For our purposes here, we merged the data from all the subsamples and, for simplicity, analyse the first WTP question only.

After a typical CV survey build-up with information, knowledge and warm-up questions, respondents were presented the damage table and asked their maximum household WTP a tax per year for a ten-year period to avoid each of the damage levels in turn. The environmental situation with and without preventive measures were shown for pairwise comparisons, and the remaining columns faded out. A horizontal payment card slider was used for each damage level. There were 23 amounts on the scale ranging from 0 to NOK 15000, including an option to specify exact amount if more than NOK 15000 and “Don’t know”.

### **3.3 CV survey on impacts of climate forest planting**

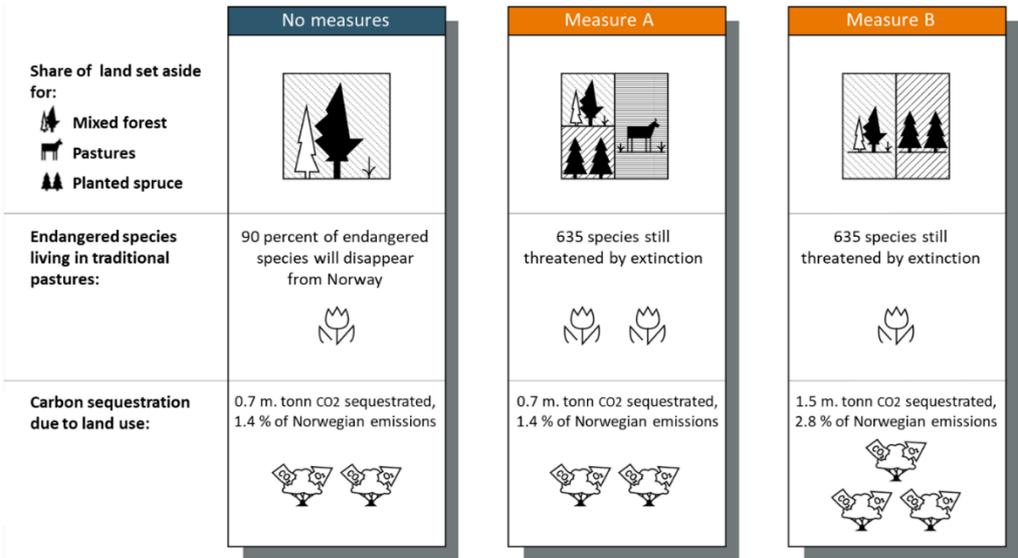
The topic of the second CV survey, conducted in 2019, was land use options for abandoned on- and off-farm pastures in Norway. In recent decades, 8500 km<sup>2</sup> of semi-natural pastures (hereafter pastures) have been abandoned, of which 1350 km<sup>2</sup> have quite recently been abandoned and have not yet become forested (Iversen et al. 2019). These pastures are now in the process of natural reforestation with mixed forests. The government is considering to plant climate forests (spruce) on these pastures. Climate forests would sequester carbon but would also reduce biodiversity and change the landscape aesthetics. We designed a survey to elicit people’s preferences for carbon forests and other land use options, based on a qualitative study using Q-methodology (Grimsrud et al. 2020) and a large pilot survey (Iversen et al. 2019). It was clear from these studies that the main concerns for the land use were, in addition to the cost, combinations of land use aesthetics, biodiversity and climate sequestration. The survey was conducted by the same professional survey firm as the oil survey (NORSTAT). We obtained a sample of 731 complete responses. Following the standard introductory CV section containing information, knowledge and warm-up questions, respondents were presented textual and visual information regarding impacts of different land-use options for landscape aesthetics, biodiversity<sup>12</sup> and carbon sequestration. The impacts were evaluated by use of the official report on the Climate forest pilot program and expert knowledge on carbon sequestration and biodiversity (Norwegian Environmental Agency 2013; Henriksen and Hilmo 2015a; Henriksen and Hilmo 2015b). Respondents were informed that land management of the abandoned pastures would be costly for the government, while leaving the areas for natural reforestation with mixed forest would not entail any cost.

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<sup>12</sup> Biodiversity was described in terms of (vascular) plants such as flowers, herbs and grasses, as well as the occurrence of insect species.

The first CV scenario, which had a mix of 25 percent pasture, 25 percent climate forest and 50 percent naturally reforested areas with mixed forests, was the same for all respondents, i.e. measure A in Figure 2. For our purpose here and for simplicity we analyse WTP for the first CV scenario A, which was the same across all respondents.

**Figure 2 – Example of presentation of policy alternatives evaluated by respondents in the climate forest study**



As can be seen from the figure, icons and textual information were used to indicate the land use share for grazing pasture, climate forest and mixed regrowing forest (top row), and resulting biodiversity and carbon sequestration impacts (rows two and three). Respondents were informed that anything other than the current situation in which the abandoned pastures are becoming naturally reforested would require active management which has a cost that would have to be paid for by an *annual* earmarked income tax levied on all Norwegian households. People were then asked a question about their household WTP, indicated in a payment card consisting of 11 amounts from 0 to 3840, including the option to specify the exact amount if “More than 3840” and “Don’t know”.<sup>13</sup> A horizontal payment card slider was used.

After the WTP questions, respondents were asked to self-report on altruistic preferences, and ecological, and environmental attitudes in fifteen Likert scale statements. We collected statements on altruism (ALT), statements on ecological attitudes from the nature relatedness (NR) scale and

<sup>13</sup> The amounts used were harmonised with the bid vector in a choice experiment survey, not analysed here.

statements on environmental attitudes from the new environmental paradigm (NEP) scale. The questions on respondents' self-reported altruism were as follows:

1. It is important for me to "be there" for friends, family and community
2. I am willing to share with others without expecting anything back
3. I am generally a person who thinks mostly about myself

Our statements on altruism are picked from the German Socio-Economic Panel study (Dur and Zoutenbier 2015) and Falk et al. (2016). The first statement measures a general altruistic attitude, the second statement is related to donation behaviour, while the last statement captures general egoistic attitudes.

We draw upon seven statements from the NR scale to measure ecological attitudes through cognitive, affective, and experiential connections with the natural environment. The NR scale measures contact with nature and the personality construct of subjective connection with nature and is found to predict sustainable attitudes and behaviours (Zelenski and Nisbet 2014). The NEP scale (Dunlap et al. 2000) is much used in survey research, for instance on perceptions and response to climate change (Whitmarsh 2008). We use the Whitmarsh (2008) shortened version of Dunlap's original NEP scale. Whitmarsh (2008) evaluated the shortened scale through principal components analysis and found it to be reliable for measuring environmental consciousness (Whitmarsh 2008). Table 6 in Appendix A.1 present the questions and the distribution of answers.

## **4. Results**

### **4.1 Donating respondents' willingness to pay across two CV surveys**

We start by testing our first hypothesis that past donations predict higher stated WTP across CV surveys when controlling for individual characteristics. Correlations between donation behaviour in a different decision domain and WTP in CV surveys could be explained by both an increased likelihood of donating respondents stating a positive WTP, and by donating respondents having a higher stated WTP.

**Table 3 – Estimation results. Factors explaining positive WTP (logit) and log WTP (interval regression)**

Dependent variable: (regression model)	Study 1 – Oil spill protection		Study 2 - Climate forest impacts	
	Pr (WTP>0) (Logit)	WTP (Interval regression)	Pr (WTP>0) (Logit)	WTP (Interval regression)
Donated	0.44 (0.34)	0.40*** (0.10)	-0.22 (0.47)	0.73*** (0.22)
Income (in NOK 100')	0.02 (0.03)	0.02 (0.01)	0.09** (0.04)	0.07*** (0.02)
Age (year)	0.01 (0.01)	0.01*** (0.00)	0.00 (0.01)	0.01* (0.01)
Male	0.42** (0.20)	-0.33*** (0.06)	-0.31 (0.31)	-0.24* (0.15)
Married	0.09 (0.22)	-0.17** (0.08)	-0.07 (0.41)	-0.11 (0.18)
Household size	-0.09 (0.10)	0.02 (0.03)	-0.36* (0.19)	-0.17* (0.10)
Higher education	0.39** (0.19)	0.03 (0.07)	-0.66* (0.38)	0.01 (0.16)
Constant	2.14*** (0.50)	6.48*** (0.16)	3.00*** (0.99)	5.20*** (0.45)
Log pseudolikelihood	-451.6	-5172.7	-153.7	-1145.0
Adjusted R-squared	0.019	0.007	0.033	0.016
N	1969	1876	509	509

Note: \*p<0.10, \*\*p<0.05, \*\*\*p<0.01. Model estimated using STATA logit and intreg commands. Higher education is defined as holding a bachelor, master or PhD degree from a college or university. Standard errors in brackets.

To examine whether the donators are more inclined to state a positive WTP, we estimated logit models (Wooldridge 2002) where the independent variable was equal to one for those who had a positive WTP and otherwise zero. To examine whether donating respondents state higher WTP in CV survey, we ran an interval regression on the WTP where the dependent variable was set to be the natural logarithm of the end-points of respondents' WTP interval. We included socio-demographic controls (income, age, gender, married and number of children). Table 3 presents the regression results.

Results confirm our first hypothesis that past donations predict higher stated WTP in CV surveys when controlling for individual characteristics. The logit models indicate that respondents who have donated to a charity are not significantly more inclined to state a positive WTP than other respondents.

The interval regression models indicate that respondents who have donated to a charity have positive WTP for the measure, are stating a significantly higher WTP than other respondents. The estimated coefficients on *Donated* of 0.40 and 0.73 in Table 3 imply that these respondents state about 50 percent and 100 percent higher WTP than other respondents when controlling for socioeconomic variables.<sup>14</sup> The estimated coefficients in neither study do not change significantly when excluding socioeconomic control variables from the models.

The results imply significant correlation between survey coin spending and valuation estimates in the CV surveys. In the first study on oil spill protection, the estimated mean WTP for non-donating respondents is NOK 1500 per household per year, while the estimated mean WTP for donating respondents is higher at NOK 2200 which is significantly greater with a  $t$ -value = 4.37.<sup>15</sup> In the second survey on climate forest impacts, we find an estimated mean WTP for non-donating respondents of NOK 747, while the estimated mean WTP for donating respondents is higher at NOK 1240, which is significantly greater with a  $t$ -value = 3.95.<sup>16</sup>

Donation behaviours are not well explained by typically observed socio-demographic characteristics. However, the donating respondents may still differ from other respondents in terms of other latent characteristics not typically observed by researchers, as found by De Oliveira et al. (2011).

## **4.2 Donating respondents are different from self-reported altruists**

Before we test our second hypothesis, that past donations are significantly and positively associated with WTP, also when controlling for self-reported altruism as well as other attitudes and individual characteristics, we explore whether past donors differ from self-reported altruists and other respondents in terms of characteristics, interests, and attitudes.

To categorise respondents as self-reported altruists we combine the three questions, from Study 2 on climate forest impacts, on altruism displayed in Table 6 in appendix A.1. We define respondents as self-reported altruist if they answer “strongly agree” to at least two out of the three altruism questions

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<sup>14</sup> The impact of the dummy variables on WTP are calculated as follows  $e(0.40)-1=49\%$  and  $e(0.73)-1=107\%$

<sup>15</sup> One-sided two-sample  $t$ -test with unequal variances.

<sup>16</sup> One-sided two-sample  $t$ -test with unequal variances.

and at least “agree” to a third question.<sup>17</sup> This categorises 177 respondents as self-reported altruists in our sample, of which 29 are also donators, while 49 donators are not defined as self-reported altruists.

**Table 4 – Characteristics, interests, and attitudes among past donators and self-reported altruists divided into three mutually exclusive groups**

	Self-reported altruist, not donator	Donator and self-reported altruist	Donator, not self-reported altruist	<i>Diff.</i>	<i>Diff.</i>	<i>Diff.</i>
	Group 1	Group 2	Group 3	(2)-(1)	(3)-(1)	(3)-(2)
Age	54.3	57.6	60.6	3.25	6.29**	3.04
Male	52 %	55 %	35 %	3 %	-17 %**	-20 %*
Married	57 %	55 %	51 %	-2 %	-6 %	-4 %
Household size	2.44	2.10	1.98	-0.33*	-0.46***	-0.13
Higher education	68 %	59 %	72 %	-10 %	4 %	13 %
Household inc.	820	658	707	-162**	-113*	49
<b>Interested in:</b>						
Charitable work	43 %	62 %	53 %	20 %*	11 %	-9 %
History and culture	53 %	62 %	51 %	9 %	-2 %	-11 %
Food and wine	61 %	52 %	51 %	-9 %	-10 %	-1 %
Politics	55 %	55 %	53 %	0 %	-2 %	-2 %
Economy	51 %	31 %	28 %	-20 %**	-23 %***	-3 %
Outdoor recreation	37 %	31 %	30 %	-6 %	-7 %	-1 %
<b>Attitudes:</b>						
Altruism	3.78	3.75	3.08	-0.03	-0.70***	-0.67***
Nature relatedness	3.27	3.24	3.06	-0.03	-0.21***	-0.18*
Env. consciousness	3.18	3.31	3.26	0.12	0.08	-0.05
N	148	29	43			

Note: Note: \*p<0.10, \*\*p<0.05, \*\*\*p<0.01. Two sampled t-test with unequal variances. Higher education is defined as holding a bachelor, master or PhD degree from a university or a college.

In Table 4 we compare self-reported altruists, donators, and self-reported altruistic donators in terms of characteristics, interests, and attitudes.

Donators (Group 3) and self-reported altruists (Group 1) differ significantly in several aspects.

Donators (Group 3) are:

- significantly older,
- more often female,
- less interested in the economy,

<sup>17</sup> The third altruism (ALT3) question was recoded to move in the same directions in terms of altruism as the two first. Some of the NR and NEP questions (NR3, NEP1, NEP4 and NEP5) were also recoded to go in the same directions as other items.

- state a lower degree of nature relatedness,
- earn less money,
- live in smaller households,

compared to self-reported altruists in Group 1. Interestingly, donators (Group 3) are significantly more often female than donators who also self-report as being altruistic (Group 2). Donating self-reported altruists (Group 2) differ significantly in a few aspects from self-reported altruists (Group 1). Donating self-reported altruists in Group 2 are:

- more interested in charitable work,
- less interested in the economy,
- earn less money,
- live in smaller households,

compared to self-reported altruists in Group 1.

The fact that donating respondents (Groups 2 and 3) are significantly less interested in the economy than the others, a result we also see in Table 2, could indicate lower marginal utility of private consumption. Logically, lower marginal utility of private consumption should result in a higher WTP for public goods through increased taxes, *ceteris paribus*. To analyse whether past donations and self-reported altruism, nature relatedness and environmental consciousness predict WTP in SP we need to apply a structural equation model (SEM) to account for measurement issues when dealing with latent attitudes.

### **4.3 The donating respondents' WTP when controlling for attitudes**

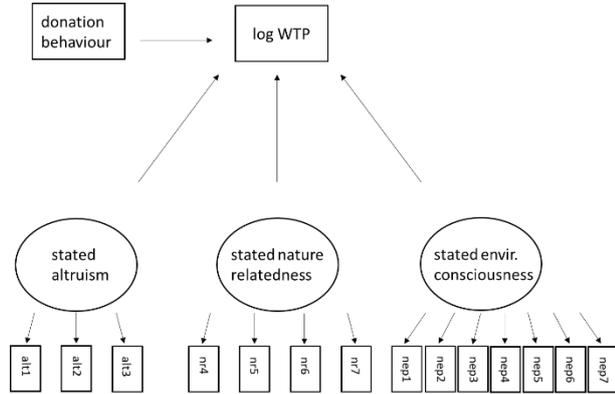
This section tests our second hypothesis that past donations is significantly and positively associated with WTP also when controlling for self-reported altruism as well as other attitudes and individual characteristics.

We apply a structural equation model (SEM) to analyse how donating respondents, observable characteristics and latent altruistic, ecological, and environmental attitudes are related to WTP in Study 2 on climate forest impacts. SEM allows for large numbers of variables to be reduced to smaller numbers of latent variables through confirmatory factor analysis and handles the measurement error estimating these latent variables. The three statements on altruism, four statements on ecological attitudes and the six attitudes on environmental consciousness are measuring the latent factors of altruism, nature relatedness and environmental consciousness among respondents. Instead of including all indicators directly into the regression model, the SEM sums the indicators' shared variance into the

associated latent variable. The variance that the indicators do not share is assumed to be measurement error, and thus left out of the latent variable. We ran a SEM to include the latent factors as controls when examining the donators' WTP, see the diagram in Figure 3.

Observed variables are depicted as squares, while unobservable variables are shown as ellipses. Directed arrows designate regression coefficients. The latent variables are assumed to affect the indicators and log(WTP) and to be correlated.

Figure 3 – The structural equation model



We estimate the following SEM:

$$\log(\text{WTP}) = \beta_1 \text{"donation behaviour"} + \beta_2 \text{"stated altruism"} + \beta_3 \text{"stated nature relatedness"} + \beta_4 \text{"stated envir. consciousness"} + \varepsilon_1, \quad (3)$$

where latent variables in (3) are measured by following measurement equations:

$$\text{"stated altruism"} = altr1 + altr2 + altr3 + \varepsilon_2, \quad (4)$$

$$\text{"stated nature relatedness"} = nr4 + nr5 + nr6 + nr7 + \varepsilon_3, \quad (5)$$

$$\text{"stated environmental consciousness"} = nep1 + nep2 + nep3 + nep4 + nep5 + nep6 + nep7 + \varepsilon_4. \quad (6)$$

The question formulations and distributions for indicators  $altr1$ - $altr3$ ,  $nr1$ - $nr7$  and  $nep1$ - $nep7$  are presented in appendix A.1. Parameters are estimated using numerical optimisation comparing the sample covariance matrices and the estimated covariance matrices. The most used optimisation method is the maximum likelihood (ML) approach, but ML relies on a multivariate normality assumption violated when indicators are categorical. We take the categorical nature of our indicators into account and estimate the parameters using the diagonally least squared model and let the chi-squared test statistic be mean- and variance-adjusted (Santorra and Bentler 1994).<sup>18</sup> The parameters of

<sup>18</sup> Due to few answers in one of the four categories across the indicators, we collapse the smallest categories and reduce to three categories.

the model to be estimated include the structural parameters and factor loadings relating observed indicators to latent variables, the measurement-error variances, the variance of the latent exogenous variables, and measurement-error covariances.

We ran two models. In Model 1, we included a dummy for the respondents who have donated and controlled for the latent attitudes, as visualised in Figure 3, while in Model 2 we also included respondent characteristics as control variables. We use the log of the midpoints of the payment card cost amounts as the WTP variable, and we allow error terms between the latent variables to be correlated. We omitted *nr1-nr3* due to loading factors of less than 0.5. If the loading factor is less than 0.5, the variance due to measurement error is larger than the variance captured by the factor, which makes the validity of the indicators and the factor questionable (Fornell and Larcker 1981). The factor loadings are presented in Table 7 in Appendix A.2. Table 5 presents the results of the two regressions.

**Table 5 –Study 2 – Climate forest impacts. Factors and attitudes explaining WTP. Structural equation model, non-standardised coefficients**

	Dependent variable: log WTP	
	Model 1	Model 2
Donated	<b>0.569***</b> <b>(0.148)</b>	<b>0.521***</b> <b>(0.158)</b>
Log income (per hundred thousand NOK)		0.121 (0.137)
Age (per year)		0.009** (0.005)
Male		-0.068 (0.113)
Married		-0.194 (0.139)
Household size		-0.046 (0.061)
Higher education		0.021 (0.136)
Stated altruism	0.095 (0.106)	0.110 (0.117)
Stated nature relatedness	0.332** (0.129)	0.337** (0.277)
Stated environmental consciousness	-0.096 (0.106)	-0.067 (0.158)
CFI (robust)	0.978	0.981
RMSEA (robust)	0.051	0.036
N	409	350

Note: \*\*p<0.05, \*\*\*p<0.01. WTP is the natural logarithm of the midpoint of the respondents' chosen payment value on the payment card and the next higher value. The models are estimated using the lavaan package in the R program. Higher education is defined as holding a bachelor, master or PhD degree from a college or university. Standard errors in brackets.

Results confirm our second hypothesis, that past donations are significantly and positively associated with WTP also when controlling for self-reported altruism as well as other attitudes and individual characteristics.

Model 1 returns a positive and significant coefficient at 0.562 for the dummy on respondents who have donated at least once, when controlling for latent altruistic, ecological, and environmental attitudes. Thus, the coefficients are close to the coefficients we got without controlling for latent attitudes (presented in Table 3). When we include control variables in Model 2, the dummy on donating respondents decrease to 0.521 and remain significant at the 1 percent level. Stated nature relatedness and age also significantly increase WTP. To evaluate the models, we use the Comparative Fit Index (CFI) and the Root-Mean-Square Error of Approximation (RMSEA). The fit statistics of both models indicate good fit.<sup>19</sup>

## 5. Discussion and conclusions

We examine the association between individuals' past donation in the survey shop and the same individuals' stated WTP in two (unrelated) CV surveys with different respondents: (1) coastal ecosystem service protection from oil spill damages, and (2) impacts of climate forest planting. Our results confirm our two hypotheses. First, we find past donations to predict higher stated WTP across CV surveys when controlling for individual characteristics. Second, we find past donations to predict higher WTP also when controlling for self-reported altruism as well as other attitudes and individual characteristics.

Our results support the hypothesis that altruistic behaviour in one decision domain is a good predictor of altruistic behaviour also in other domains. Several authors argue that prosocial behaviour is persistent across decision domains (e.g. Franzen and Pointner 2013; De Oliveira et al. 2011; Carpenter and Myers 2010; Landry et al. 2010; Yeomans and Al-Ubaydli 2018). De Oliveira et al. (2011) find that individuals who give to one organisation, give significantly more to other organisations. We find, like De Oliveira et al. (2011), that donators' WTP are not well explained by observable individual characteristics, but seem to correlate with latent altruistic preferences, in this case not fully picked up by self-reported altruism. Our results seem to contradict Galizzi and Navarro-Martinez (2018) and

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<sup>19</sup> The CFI and the TLI should be greater than 0.9, ideally above 0.95, whereas RMSEA and the SRMR should be less than 0.06 and 0.08, respectively (Hu and Bentler, 1999)

Ross and Nisbett (2011) who find and argue that individuals' prosocial behaviour are unpredictable across decision domains.

Our results imply that self-reported altruism measures do not capture all respondents' preferences for contributing. Some donators do not consider themselves altruistic, some donators might be motivated by "warm glow", while other donators might be very humble or overly self-critical when answering personal questions, saying that they are not altruistic when others would. Interestingly, we find that female donators are less likely to self-report as being altruistic, in line with women being more self-critical than men in general (Collins 1996).

At the same time, our result might indicate that warm glow preferences are biasing the WTP in SP upwards. If the donating respondents get a positive warm glow feeling when stating higher WTP in SP surveys, disregarding others' utility and the good itself, they will bias the WTP for the environmental good even in incentive compatible and consequential surveys (Lusk and Norwood 2009).

Several studies find indications that some donators are motivated by warm glow preferences (e.g. Falk 2020). Hartmann et al. (2017) find that stated warm glow is a stronger influence on WTP than self-reported altruistic attitudes and stated environmental attitudes and argue that warm glow helps explain why individuals lacking altruistic values still engage in seemingly altruistic prosocial behaviour, a finding shown by Cialdini et al. (1997). Although warm glow in SP has been a topic of some interest, it has not played a major role in the literature on CV over the last decade (Bishop 2018). One reason could be the problem of separating legitimate pure and paternalistic altruistic values from the illegitimate values stemming from the warm glow of giving. As Francois de la Rochefoucauld said: "Virtues are lost in self-interests as rivers are lost in the sea". Isolating, measuring, and controlling for warm glow in SP is troublesome to say the least.

We find that donators are significantly less interested in the economy than other respondents, which may indicate a lower marginal utility of money among donators. This would logically imply a higher WTP, *ceteris paribus*. Thus, lower marginal utility of money could both explain donations and higher WTP in SP, independently of both pure and paternalistic altruism and warm glow preferences.

Future research should examine altruistic preferences in welfare economics and CV studies. Furthermore, combining past behaviour with preference elicitation opens new avenues for tests of altruism in preference elicitation. Thorough research into individuals' marginal utility of money,

prosocial behaviours, altruistic motivations and WTP in SP could help unmask the causal relationship between the different factors. A possible extension would be to conduct different types of dictator games to uncover motives such as pure and impure altruism and paternalism, in combination with the valuation of public goods through SP surveys. Combining insights from experimental economics and SP surveys would shed light on the influence of different altruistic motives affecting valuation surveys, with important consequences for cost-benefit applications.

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## Appendix

### *A.1 Self-reported altruistic, ecological, and environmental attitudes*

Higher WTP among donating respondents could stem from altruism or ecological and environmental attitudes. Pro-ecological and pro-environmental attitudes are expected to increase WTP for measures improving environmental quality. Altruism is also expected to increase WTP through both paternalism, meaning caring for some but not all aspects of others' utility (Johansson and Kriström 2021), and warm glow of giving.

We have collected respondents' altruism, and ecological, and environmental attitudes in fifteen Likert scale statements. We collected three statements on altruism, seven statements on ecological attitudes from the nature relatedness (NR) scale and six statements on environmental attitudes from the new environmental paradigm (NEP) scale. Table 6 presents the distribution of answers.

**Table 6 –Likert scale percentages on strength of agreement with statements from 1(strongly disagree) to 4 (strongly agree).**

Questions	1	2	3	4
alt1 It is important for me to "be there" for friends, family and community	0 %	3 %	49 %	48 %
alt2 I am willing to share with others without expecting anything back	1 %	3 %	63 %	33 %
alt3 I am generally a person who thinks mostly about myself	27 %	59 %	13 %	1 %
nr1 I enjoy being in the open air, even in bad weather	4 %	20 %	50 %	25 %
nr2 I enjoy digging into the soil and getting dirt on your hands	9 %	30 %	45 %	17 %
nr3 I don't often go into nature	28 %	45 %	22 %	5 %
nr4 I think about how my actions affect the environment	1 %	14 %	64 %	21 %
nr5 Environmental protection generally creates a better world for me and my children	1 %	4 %	55 %	40 %
nr6 Environmental protection is useful for my health	1 %	5 %	61 %	34 %
nr7 A clean environment gives me better recreational opportunities	1 %	2 %	54 %	43 %
nep1 People have the right to change the natural environment to suit their own needs	22 %	48 %	28 %	2 %
nep2 Humans abuse the planet	1 %	8 %	51 %	40 %
nep3 Plants and animals have the same right as humans to exist	2 %	15 %	51 %	32 %
nep4 Nature is strong enough to tackle modern industrial nations	24 %	57 %	17 %	3 %
nep5 Humans are meant to rule the rest of nature	28 %	45 %	23 %	4 %
nep6 Nature's balance is delicate and can easily end up in disregard	1 %	5 %	57 %	37 %

Note: 1 = Strongly disagree, 2=disagree, 3=agree, 4=strongly agree

Our statements on altruism are gathered from the German Socio-Economic Panel study (Dur and Zoutenbier 2015) and Falk et al. (2016). The first statement measures a general altruistic attitude,

whether respondents agree that it is important to “be there” for others, which almost everybody agree to, half of the respondents strongly agree. The ALT2 statement is related to donation behaviour, asking whether respondents are willing to give without expecting anything back. Fewer are strongly agreeing with this statement which should indicate respondents’ interest in donating to charities and organisations, capturing the pure altruistic feeling of helping others become better off, while also capturing the warm glow feeling of giving. The last statement ALT3 captures general egoistic attitudes, so if respondents strongly disagree, then they might be considered altruistic. We combine these three statements to control for respondents’ altruistic attitudes.

We draw upon seven statements from the NR scale to measure ecological attitudes through cognitive, affective, and experiential connections with the natural environment. The NR scale measures contact with nature and the personality construct of subjective connection with nature and is found to predict sustainable attitudes and behaviours (Zelenski and Nisbet 2014).

The NEP scale (Dunlap et al. 2000) is much used in survey research, for instance on perceptions and response to climate change (Whitmarsh 2008). We use Whitmarsh (2008) shortened version of Dunlap’s original NEP scale.

### ***A.2 The measurement model loading factors***

Construct validity is the extent to which indicators of a latent variable measure what they are supposed to measure. Construct validity addresses the degree of agreement of indicators hypothesised to measure a latent variable, and multiple indicators of the same latent variable should be highly correlated and correlated relatively uniformly, stemming from a single latent variable, not two or more variables. The size of the standardised factor loadings is often used to evaluate the validity (Bagozzi and Yi 2012).

**Table 7- Standardised Factor Loadings of Measurement Models**

	<b>Stated altruism</b>	<b>Stated nature relatedness</b>	<b>Stated environmental consciousness</b>
alt1	0.607		
alt2	0.891		
alt3	0.517		
nr4		0.679	
nr5		0.951	
nr6		0.952	
nr7		0.783	
nep1			0.511
nep2			0.753
nep3			0.617
nep4			0.773
nep5			0.681
nep6			0.662

The rule of thumb is that the standardised factor loadings should exceed 0.5, ideally 0.7 for the indicators to be highly correlated and correlated relatively uniformly (Hair et al. 2014). Each standardized loading is above 0.5 in the measurement models, which indicates convergent validity.