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# Altruist Talk May (also) Be Cheap: Revealed Versus Stated Altruism as a Predictor in Stated Preference Studies

**Endre Kildal Iversen**[1,6] · **Kristine Grimsrud**[3] · **Yohei Mitani**[4] · **Henrik Lindhjem**[2,5]

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**Abstract**
Altruistic preferences have been found to be important for explaining the substantial non-use values identified in numerous stated preference surveys. However, studies analysing the effect of altruism on willingness to pay (WTP) have underestimated the challenges of measuring altruism by stated measures. We exploit a naturally occurring decision domain to investigate the role of altruism in stated preference studies. We employ a novel dataset, collected from an Internet survey panel, that contains respondents' past donations of earned survey coins to charities and use these data to analyse the effect of donation behaviour on the same respondents' WTP. We analyse donation behaviour across two contingent valuation surveys on environmental topics. Donators are proven givers in an anonymous and unrelated setting, much like decision-making in a dictator game. We find that respondents' past donations are associated with higher WTP, even after controlling for *stated* measures of altruism, ecological, and environmental attitudes. The results suggest that measures of stated altruism fail to capture important aspects of altruism, implying that previous studies of altruism based on such measures may be questioned. The results also support research demonstrating that altruistic behaviour in one decision domain is a good predictor of altruistic behaviour in other domains.

**Keywords** Prosocial behaviour · Altruism · Contingent valuation · Donations · Willingness to pay

## 1 Introduction

Altruistic preferences shape prosocial behaviour across several decision domains and affect market outcomes, donations to charities, volunteering time, and elections (Bolsen et al. 2014; De Oliveira et al. 2011). Understanding such preferences have proved to be highly important in environmental economics for valid and reliable non-market valuation

✉ Endre Kildal Iversen
endre.iversen@snf.no

Extended author information available on the last page of the article

of environmental goods (e.g., McConnell 1997; Carson et al. 2001) and for the design of more effective or acceptable policy instruments (Svenningsen and Thorsen 2020; Dasgupta et al. 2016; Gsottbauer and Van den Bergh 2011; Menges et al. 2005).[1] By prosocial behaviour, we mean people's actions that benefit others or society and are motivated by people's social preferences, such as altruism and reciprocity.[2] Altruism may motivate people to donate money to charities or to help known and unknown people in any manner. Although prosocial behaviour alleviates collective action problems in real life, altruistic preferences have led to theoretical and practical difficulties in welfare economics and cost–benefit analysis (Bergstrom and Cornes 1983; Flores 2002; Bergstrom 2006; Binder 2020).

People value environmental goods for different reasons, including altruism toward others and future generations. Stated preference (SP) methods (contingent valuation (CV) and choice experiments (CE)) are the only methods that can capture both use and non-use values associated with changes in environmental goods for cost–benefit analysis. Kahneman and Knetsch (1992) questioned the use of such estimates in cost–benefit analysis and argued that CV studies invited to a "purchase of moral satisfaction" leading to scope insensitivity.[3] In a recent review of warm glow in CV, Bishop (2018) argues that such values should be included in the willingness to pay (WTP) estimates from CV studies and points to that there has been little evidence of warm glow being the source of validity issues.[4] We argue that if people receive a warm glow when stating WTP taxes in the CV survey context, while they do not receive a corresponding warm glow when in fact paying the taxes, CV estimates might be biased.[5]

Since altruism is an essential factor when explaining substantial non-use values (Bouma and Koetse 2019), altruism is also important for policy decisions based on cost–benefit analyses that use CV estimates. Research to date has analysed the effect of (stated) altruism on WTP and hypothetical bias, focusing on the validity and reliability of the WTP measure, while the validity of the self-reported altruism measures applied has not been investigated in CV studies to our knowledge. This paper investigates altruistic preferences motivating prosocial behaviour across decision domains. We utilise novel data on Internet panel survey respondents' past donation behaviour as an indicator of altruistic preferences when analysing WTP for environmental goods in two separate CV surveys. For one of the

[1] This is also an important topic in valuation of environmental health risks and design of health policies (e.g. Jacobsson et al. 2007; Dickie and Gerking 2007).

[2] Reciprocal preference 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 Schmidt 2006). Reciprocity promotes social norms, by encouraging hard-working colleagues or sanctioning free riders (Czajkowski et al. 2017).

[3] Sensitivity to scope in nonmarket valuation refers to the property that people are willing to pay more for a higher quality or quantity of a nonmarket public good (see e.g., Dugstad et al. 2021).

[4] 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. In Andreoni's framework, warm glow reflects the utility a consumer gains from personally donating toward a public good (Bishop 2018).

[5] Whether or not to include altruistic preferences in cost–benefit analysis at all has been discussed in welfare economics (Flores 2002). Bergstrom and Cornes (1983) argue that cost–benefit analysis should only take self-regarding egoistic preferences into account. The sympathetic gains each person obtains from other's enjoyment of shared public goods should be balanced out by the sympathetic losses each bears from the share of its cost paid by the others (Bergstrom 2006). Flores (2002) showed that for larger discrete changes in public goods, efficient policies depend on the distribution of benefits and costs, and one must therefore take prosocial preferences into account.

surveys, we also elicit respondents' altruistic, ecological, and environmental attitudes and compare the effect of stated altruism and actual past donations on respondent WTP.

Our measure of altruistic prosocial behaviour captures both pure altruistic motives and partly warm glow of giving following the framework of Andreoni (1989). The measure captures warm glow motivated by self-signalling and should be independent of other confounding motives such as warm glow motivated by signalling towards others, often termed social desirability bias, and reciprocity. Donating respondents in our study first earned their money by answering surveys and then made an impersonal and anonymous donation decision, which suggest altruism or warm glow are motivating them.

We examine the association between individuals' past donations of their survey coins and the stated WTP at the extensive and intensive margin in two (unrelated) CV surveys with different respondents: (1) coastal ecosystem service protection from oil spill damages, and (2) impacts of climate forest planting. The data sets from both surveys are merged with data on each respondent's past donations of earned survey coins from the survey company.

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

## 2 Literature, Conceptual Background, and Hypotheses

### 2.1 Literature Background

Validity of the SP methods has been criticised for various reasons including the handling of altruistic preferences related to non-use values. As mentioned, Kahneman and Knetsch (1992) argue that CV studies invite a "purchase of moral satisfaction", causing scope insensitivity and embedding effects. Chilton and Hutchinson (2000) show that the warm glow motive may be present in most respondents' WTP but that this may not imply scope insensitivity. Moreover, Johansson-Stenman and Svedsäter (2012) develop and test a model where people derive utility from a positive self-image and self-honesty and find that people overstate their WTP for goods with a perceived ethical dimension to uphold a positive self-image. Along similar lines, Entem et al. (2021) and Svenningsen and Jacobsen (2018) find that people overstate their WTP for public goods with moral components.

Bishop (2018) claims that there should not be warm glow effects in CV studies since respondents typically are asked for their willingness to pay taxes and not for their willingness to donate. Bishop (2018) contends that a bias might occur if the payment vehicle in a CV study is designed differently from how payments actually would have been made. But this would be a payment vehicle bias due to survey design issues and not a problem relating to warm glow.

Several other studies point out that respondents' warm glow feelings from stating high WTP bias results if such motivations are context specific and not transferable from the survey context to the policy context (Entem et al. 2021; Johansson-Stenman and Svedsäter 2012; Lusk and Norwood 2009; Chilton and Hutchinson 2000). Entem et al. (2021) argue that respondents' altruistic preferences and social desirability bias can contribute to

hypothetical bias, even in incentive-compatible SP surveys.[6] Warm glow feelings can be interpreted as an intrinsic self-image gain derived from contributing to the public good (Daube and Ulph 2016). Psychological research has found observable physiological and psychological benefits of self-signalling by people doing "the right thing". They are rewarded by a release of neurotransmitters increasing their body heat and experience a physical warm glow sensation (Van der Linden 2015). Eckel et al. (2005) find no warm glow effects of paying taxes to support charity in a laboratory experiment. Thus, if answering with higher WTP in SP releases neurotransmitters while paying the corresponding tax do not, warm glow in SP surveys might bias results.

To analyse altruism in a study unrelated to SP, Ekström (2018) utilises 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. Ekström (2018) points to several reasons for why this decision situation is suitable for use in studying altruistic preferences: monetary incentives for donations are absent, there is no reciprocal motivation between the donator and the charity, and solicitation is typically impersonal and anonymous. We analyse altruism using data from a similar decision situation: a survey company's data on enrolled Internet panel respondents' donations of coins earned through taking part in surveys to charities. By answering questions in regular online surveys, respondents earn coins they may use freely on either private goods or donations to charities in an online shop. As in Ekström (2018), the decision involves an anonymous and impersonal choice between self and others with no expectation of monetary or nonmonetary compensation in return.

The decision setting resembles the nonstrategic decision setting in dictator games.[7] 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; most subjects exhibit prosocial behaviours.[8] Bekkers (2007) compares decisions regarding the donation of survey coins to dictator games and confirms close similarities in results and donator characteristics. About 6% of the survey respondents donated their money, and donations increased with age, education, income, trust, and prosocial value orientation 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).

Carpenter (2018) finds the self-reported altruism measures used in the literature to have varying predictive power. Although several studies have verified 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 in their attempts to capture aspects of altruism.[9] Such altruistic

[6] Hypothetical bias problems have led to several important methodological developments and updated guidelines (Johnston et al. 2017; Kling et al. 2012).

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

[8] Engel (2011) conducts a meta-study and finds that about 63% of dictators allocate some coins to the recipients and that 28% of total coins are allocated to the recipients, while 72% is kept by the dictator. The proportion of coins allocated depends on various conditions. For example, donations are reduced when dictator endowment is earned through tasks, the dictators' age increases donations and deserving recipients receive more donations (Engel 2011).

[9] For example, statements such as "There are some funding campaigns to which my family and I feel very close and therefore we do not hesitate to contribute a donation" or "It is difficult for me to decline my help

statements may capture certain altruistic preferences (Hartmann et al. 2017), but the measures could be biased and blurred by idealised personality bias[10] or social desirability bias (Carpenter 2002). Carpenter and Myers (2010) argue that the incentivised dictator game is the best indicator of altruism. 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 for developing and testing altruism survey questions.

Individuals' altruistic behaviour across decision domains have previously been studied through comparisons of laboratory and field experiments (Franzen and Pointner 2013; De Oliveira et al. 2011; Carpenter and Myers 2010; Galizzi and Navarro-Martinez 2019; 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 donate significantly more to other (unrelated) organisations as well. They discover that giving decisions are not explained by observable individual characteristics but by latent preferences for donating. Others find a lack of correspondence in behaviour across different settings. For example, Galizzi and Navarro-Martinez (2019) do not find persistent altruistic behaviours across social preference games, field situations related to giving money and helping others, and self-reported measures of altruistic tendencies shown in the past.

### 2.2 Conceptual Framework and Hypotheses

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

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

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

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

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 (1989) framework. If $\frac{\partial I}{\partial g} > 0$, the individual gets utility by paying for the public good per se, much like the warm glow of giving in Andreoni's (1989) framework.

Footnote 9 (continued)
to other individuals who, either in the streets or at my door, beg for charity". Examples are taken from Nunes and Schokkaert (2003).

[10] Respondents reporting how they want to perceive themselves.

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 has higher WTP for environmental goods across the two CV surveys than a respondent that is not of the "giving-type". We expect a respondent's past donations to predict an increased propensity to state a positive WTP (the extensive margin) compared to non-donating respondents. We also expect a higher predicted mean WTP (the intensive margin) of respondents who have donated their survey coins in the past than respondents who have not made such donations. We further test whether past donations are associated with scope insensitivity.

Our second hypothesis is that past donations are significantly and positively associated with WTP even when controlling for self-reported altruism and other attitudes and individual characteristics. Support for this hypothesis implies uncovering new information on the role and importance 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. We first present the donation data across the two surveys and then describe each of the two valuation surveys.

### 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 a reputable Norwegian survey company. The system for awarding and spending survey coins has evolved within the survey industry. Within the survey company's system, a minute of stipulated time spent answering surveys is typically 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 that offers different private consumption options or donations to various types of charitable organisations.

In the first survey on protection from oil spill damages (Study 1), there were 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 they could spend their coins 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 free of charge (e.g., supporting the elderly). The oil spill study contained 4846 respondents who completed the survey answering the CV payment card question. For a significant share of the respondents (38%), we have no data because they had not yet spent their survey coins at the time of the CV survey. These respondents were, therefore, removed from the sample, leaving 2461 unique respondents of whom 12% donated their coins to a charity of some kind.[11]

[11] We have run the models presented in this paper coding respondents without data on the spending decision as non-donators. The results are not sensitive to removing these respondents.

In the second survey on the impacts of climate forest planting (Study 2), we have data on respondents' use of survey money during a period of five years (2014 to 2018). Respondents spent their coins in a survey shop similar to the one described above, which offered a range of products and gift cards or donated their coins to various types of charities. Our dataset contained 731 respondents who had completed the survey answering our CV payment card question.[12] Of these, 615 respondents had spent the coins obtained by the survey company, while we have no data on the remaining 116 respondents because by the time of the CV survey, they had not yet spent their survey coins. About 13% of the 615 respondents donated their coins to a charity at least once. The shares of donating survey respondents are higher than in Bekkers (2007), which explores decisions concerning donation of earned survey coins and finds that 6% of respondents chose to donate their earnings to charities in their panel. The difference is explained by the fact that each respondent in our datasets made several spending decisions. About 8% of all spending decisions in the Study 2 dataset were donations.

See Tables 1 and 2 for an overview of our spending decision data sets.

Table 1 shows the number of donators among our respondents in studies 1 and 2. In Study 1, we only know whether the respondent chose predominantly to donate during her or his panel membership. In Study 2, we have more information on the donations made by

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

| | Donated (at least once) | Percent donators of respondents (%) | Total respondents |
|---|---|---|---|
| Study 1—Oil spill | 289 | 12.0 | 2461 |
| Study 2—Land use | 78 | 12.7 | 615 |

**Table 2** Descriptive statistics of donations made by respondents in Study 2—Land use

| | Times donated | Number of respondents | Number of spending decisions (mean) | Share of coins donated (mean) (%) |
|---|---|---|---|---|
| Non-donators | 0 | 537 | 2.94 | 0 |
| Donators | 1 | 44 | 2.29 | 42.9 |
| | 2 | 15 | 2.4 | 77.0 |
| | 3 | 11 | 3.27 | 81.5 |
| | 4 | 3 | 4.33 | 93.3 |
| | 5 | 5 | 5 | 96.8 |

[12] 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 the distribution of past donations.

**Table 3** Descriptive statistics of respondent characteristics in the data sets

| | Donating respondents | | Not donating respondents | | Difference in means between groups |
|---|---|---|---|---|---|
| | Mean | N | Mean | N | |
| *Study 1—Oil spill protection* | | | | | |
| 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* |
| *Study 2—Climate forest impacts* | | | | | |
| 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 |
| *Interested in* | | | | | |
| 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% |

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. Two sample t-test with unequal variances. Higher education is defined as holding a Bachelor's, Masters' or PhD degree

the respondents. Unfortunately, the survey company was not able to release details on how much the respondents donated, both individually and in total.[13]

As shown in Table 2, most donators (44 out of 78) only donated once before participating in Study 2, while they had made 2.29 spending decisions on average. This implies that many of these respondents had donated once and spent their coins on private consumption on another occasion. Respondents who donated once donated an average of 42.9% of their total survey coins throughout the last five years of their panel membership. On average, the more often the respondent donated coins, the higher the overall share of coins donated. Respondents donating 5 out of 5 times, donated 96.8% of their overall coins in that period. 33 out of 78 respondents had donated all their coins, with 14 respondents donating all their coins on one single occasion, without making any additional spending decisions, while 20 respondents donated all their coins more than once.

[13] We know that about 100,000 respondents in the survey panel donated a total of 1.7 million NOK in 2020. If about 7.5% of the respondents donated that year each, on average about 225 NOK (1NOK0.1EUR) was donated per donator.

In a meta-study of donation decisions in dictator games, Engel (2011) finds that older people often donate more than others, students donate less, while women donate more. The respondents who 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 3 describes the socio-demographic characteristics of donating and non-donating respondents.

The differences in socio-demographic characteristics between donating and non-donating respondents across the two studies are relatively small. Age is the only consistent and substantial difference between the groups, with donating respondents in both studies on average about five years older than other respondents.

We find larger differences when comparing the stated interests between groups in Study 2. Donating respondents are significantly more interested in charitable work and significantly less interested in the economy than the non-donators. An interest in charitable work may indicate that donators are more interested in prosocial behaviour than other respondents. Similarly, less interest in the economy may indicate less interest in business, consumption, and money, and might imply a lower marginal utility of money among donating respondents. We also note that donating respondents have about the same interest in politics as other respondents.

### 3.2 CV Survey on Protection of Coastal Ecosystem Services from Damage Due to Oil Spills

The topic of the first CV survey was people's WTP to avoid environmental damage due to oil spills at four different sites along the Norwegian coast. The survey, conducted in 2013, built on experiences from previous CV surveys of major marine oil spills; especially that of Carson et al. (2003) on the Exxon Valdez oil spill in Alaska (which formed the basis for much of the methodological discussion of CV that followed[14]) and that of Loureiro et al. (2009) of the Prestige oil spill in Spain in 2002. The aim was to establish a set of unit values for a range of types of damage to ecosystem services due to oil spills for use in a cost–benefit analysis of measures conducted by the Norwegian Coastal Administration for preventing oil spills from ships (details of the survey design and process are given in Navrud et al. (2017)).

After thorough testing in focus groups, one-to-one interviews and piloting, the survey was conducted with random sampling of respondents from the survey company's 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% across the subsamples.

Each respondent received four CV scenarios (from small to very large losses of coastal ecosystem services), where preventive measures could avoid all damage due to oil spills for the next few years and leave the environment in the present condition (Fig. 1). Four categories of damage were described: harm to birds, harm to seals, damage to the coastal zone and harm to other marine life. Damage was assessed using expert knowledge, and the

[14] 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).

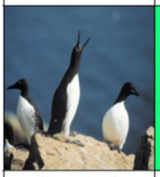
| | With measures | Without measures | | | |
|---|---|---|---|---|---|
| | **Present conditions** | **Small loss** | **Medium loss** | **Large loss** | **Very large loss** |
| Damage to birds | | | | | |
|  | The area is an important breeding, migration and wintering ground for seabirds. The bird populations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

**Fig. 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)

descriptions were 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).

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).

After a typical CV survey build-up with information, knowledge and warm-up questions, respondents were presented with the damage table and asked what their maximum household WTP an annual tax would be for a ten-year period to avoid each of the damage levels in turn. The environmental situations 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 NOK 0 to NOK 15,000, including an option to specify the exact amount if it was more than NOK 15,000, and "Don't know".

### 3.3 CV Survey of the Effects of Planting Forest to Mitigate the Impact of Climate Change

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 $km^2$ of semi-natural pastures have been abandoned, of which 1350 $km^2$ have quite recently been abandoned and have not yet become forested. These pastures are now undergoing natural reforestation with mixed forest. The government is considering planting forests (spruce plantations) on these pastures. The 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-sequestering forests and other land use options, based on a qualitative study using Q-methodology and a large pilot survey.[15] It was clear from these studies that the main concerns regarding land use other than cost were combinations of land use aesthetics, biodiversity and carbon sequestration. The survey was conducted by the same professional survey firm as the oil spill survey. We obtained a sample of 731 complete responses. Following the standard introductory CV section containing general information, data and warm-up questions, respondents were presented with textual and visual information regarding the effects of different land-use options on landscape aesthetics, biodiversity[16] and carbon sequestration. The effects were evaluated using the official report on the Climate forest pilot program and expert knowledge of carbon sequestration and biodiversity (Norwegian Environmental Agency 2013; Henriksen and Hilmo 2015a, 2015b). Respondents were informed that 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.

The CV scenario, which had a mix of 25% pasture, 25% spruce forest and 50% naturally reforested areas with mixed forests are presented in the Fig. 2.

As can be seen from the figure, icons and textual information were used to indicate the shares of land used for pasture, climate forest and mixed forest regrowth (top row), and the resulting biodiversity and carbon sequestration effects (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, at a cost that would have to be paid by an *annual* earmarked income tax levied on all Norwegian households. People were then asked about their household WTP, indicated on a payment card consisting of 11 amounts from NOK 0 to NOK 3840, including an option to specify the exact amount if "More than 3840" and a "Don't know" option.[17] A horizontal payment card slider was used, as in Study 1.

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), on ecological attitudes from the nature relatedness

[15] The Q-method provides the foundation for a systematic study of subjectivity in discourse analysis. It reveals perspectives in a debate using a by-person factor analysis to identify groups of people with similar perspectives (Grimsrud et al. 2020).

[16] Biodiversity was described in terms of (vascular) plants such as flowers, herbs, and grasses, as well as insect species.

[17] Both the amounts used in the bid vector and the attribute levels in the CV scenario were harmonised with a choice experiment survey, not analysed here, explaining the constant carbon sequestration in measure A.

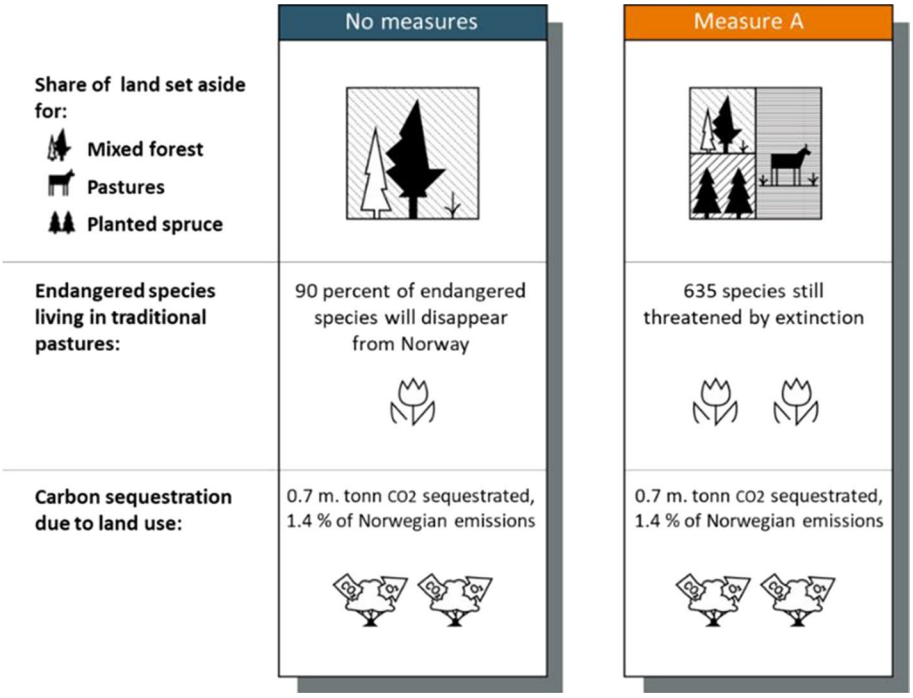



**Fig. 2** Example of presentation of policy alternatives evaluated by respondents in the climate forest study

(NR) scale and 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 gathered taken from the German Socio-Economic Panel study (Dur and Zoutenbier 2015; 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 drew 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 7 in Appendix 1 presents 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 at the extensive and intensive margin when we control for individual characteristics. Correlations between donation behaviour in a different decision context and WTP in CV surveys could be explained by both an increased likelihood of donator respondents stating a positive WTP (the extensive margin), and by donating respondents having a higher stated WTP (the intensive margin).

To examine whether the donators are more inclined to state a positive WTP, we estimated probit models where the independent variable was equal to one for those who had a positive WTP and otherwise zero.

In Study 1 on oil spills, respondents were asked for their WTP to implement measures for avoiding small, medium, large, and very large oil spills. To utilise the four WTP questions per respondent as a panel dataset, we applied random effects probit and random effects interval regression models. We used "small oil spill" as the baseline category and included dummies for medium (M), large (L), and very large (XL) oil spills. We also interacted the donation dummy with the dummies for medium, large, and very large oil spills to check for scope sensitivity among donators and non-donators. In Study 2, we utilised the richer dataset on donations and ran three regressions of donations on WTP. We included a dummy on donating respondents to analyse WTP at the intensive and the extensive margin. Further, we analysed the effect of the number of donations on WTP and analysed the share of credits donated on WTP. We included a control variable for the number of spending decisions the respondents have made during the five-year period across the four models on the Study 2 data. We had only one WTP question available for analysis and therefore applied the probit and interval regression models. We included socio-demographic controls (income, age, gender, married and number of children). To account for non-normal distributions in WTP the dependent variable was set as the natural logarithm of the end-points of the respondents' WTP interval. Table 4 presents the regression results.

The results partially confirm our first hypothesis that past donations predict higher stated WTPs in CV surveys when we control for individual characteristics. The probit models indicate that respondents who have donated to a charity at least once are not significantly more inclined to state a positive WTP than other respondents.[18] Thus, past donations seem to have little effect on WTP at the extensive margin. On the other hand, past donations seem to have a substantial and significant effect on WTP at the intensive margin. The interval regression models indicate that respondents who have donated to a charity at least once and have positive WTP, are stating a significantly higher WTP than other respondents. The estimated coefficients on *Donated* of 0.40 and 0.89 in Table 4 imply that these respondents state about 50% and 140% higher WTP than other respondents when controlling for sociodemographic variables.[19] We do not find any sign of scope insensitivity among donators, both non-donators and donators significantly increase their WTP when the size of the

[18] We also ran probit models using Number of donations made and Share of credits donated on probability on $Pr(WTP > 0)$ with very similar insignificant results as when using Donated (once or more).

[19] In a log-linear model the dummy coefficient must be transfomed to get the percentage impact on the dependent variable. In this case, the transformations of the dummy variable coefficients when going from zero to one are as follows: $\exp(0.40)-1 = 49\%$ and $\exp(0.89)-1 = 143\%$.

**Table 4** Estimation results. Factors explaining positive WTP and log WTP

| Dependent variable (regression model) | Study 1 Oil spill protection | | Study 2 Climate forest impacts | | | |
|---|---|---|---|---|---|---|
| | Pr (WTP > 0) (Random probit) | WTP (> 0) (Random interval) | Pr (WTP > 0) (Probit) | WTP (> 0) (Interval) | WTP (> 0) (Interval) | WTP (> 0) (Interval) |
| Donated (once or more) | 0.83 | 0.40*** | −0.07 | 0.89*** | | |
| | (0.56) | (0.09) | (0.22) | (0.18) | | |
| Number of donations | | | | | 0.39*** | |
| | | | | | (0.07) | |
| Share of credits donated | | | | | | 1.00*** |
| | | | | | | (0.20) |
| Number of spending decisions | | | −0.02 | −0.03 | −0.05 | −0.03 |
| | | | (0.05) | (0.04) | (0.04) | (0.04) |
| Medium loss | 0.28 | 0.23*** | | | | |
| | (0.21) | (0.02) | | | | |
| Large loss | 0.52** | 0.53*** | | | | |
| | (0.23) | (0.02) | | | | |
| Very large loss | 0.64*** | 0.75*** | | | | |
| | (0.24) | (0.02) | | | | |
| M*Donated | −0.12 | −0.01 | | | | |
| | (0.78) | (0.04) | | | | |
| L*Donated | 0.39 | −0.03 | | | | |
| | (1.02) | (0.04) | | | | |
| XL*Donated | −0.09 | −0.02 | | | | |
| | (0.90) | (0.05) | | | | |
| Income | −0.00 | 0.00* | 0.04* | 0.04** | 0.04** | 0.04** |
| | (0.00) | (0.00) | (0.02) | (0.02) | (0.02) | (0.02) |
| Age (per 10 years) | 0.00 | 0.00** | 0.04 | 0.09** | 0.11** | 0.09* |
| | (0.01) | (0.00) | (0.06) | (0.05) | (0.05) | (0.05) |
| Male | −0.74*** | −0.23*** | −0.07 | −0.15 | −0.17 | −0.17 |

**Table 4** (continued)

| Dependent variable (regression model) | Study 1 Oil spill protection | | Study 2 Climate forest impacts | | | |
|---|---|---|---|---|---|---|
| | Pr (WTP > 0) (Random probit) | WTP (> 0) (Random interval) | Pr (WTP > 0) (Probit) | WTP (> 0) (Interval) | WTP (> 0) (Interval) | WTP (> 0) (Interval) |
| | (0.22) | (0.06) | (0.15) | (0.13) | (0.12) | (0.13) |
| Married | −0.02 | −0.11 | −0.03 | −0.08 | −0.10 | −0.07 |
| | (0.28) | (0.07) | (0.18) | (0.15) | (0.15) | (0.15) |
| Household size | −0.03 | 0.01 | −0.15* | −0.04 | −0.03 | −0.04 |
| | (0.11) | (0.03) | (0.09) | (0.08) | (0.08) | (0.08) |
| Higher education | 0.63*** | 0.04 | −0.30* | 0.24* | 0.27** | 0.24* |
| | (0.22) | (0.06) | (0.17) | (0.13) | (0.14) | (0.14) |
| Constant | 6.58*** | 6.22*** | 1.46*** | 5.37*** | 5.35*** | 5.41*** |
| | (0.58) | (0.15) | (0.44) | (0.38) | (0.38) | (0.39) |
| Log likelihood | −380.3 | −15,914 | −179.8 | −1199.5 | −1203.5 | −1203.8 |
| Pseudo R-squared | 0.02 | 0.07 | 0.01 | 0.02 | 0.02 | 0.02 |
| N | 7480 | 7325 | 612 | 462 | 462 | 462 |

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. Model estimated using STATA xtprbit, xtintreg and intreg commands. Higher education is defined as holding a bachelor, master or PhD degree. Standard errors in brackets

prevented oil spill increase in Study 1. When we regress the "number of donations made" on mean WTP, we find that an extra donation decision increases the WTP by coefficient of 0.39. The Share of credits donated increases the WTP by coefficient of 1. Both coefficients are significant, while the model fit is similar across the models. These results imply that the intensity of donations, meaning the more often donated and the higher share donated, increase the WTP at the intensive margin. The results across the two studies are also robust to including the respondents without donation data as non-donators.

The results imply a 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 avoiding small oil spill among non-donating respondents is NOK 1200 per household per year, while the estimated mean WTP for donating respondents is significantly higher at NOK 1800 ($t$-value = 4.11).[20] In the second survey on climate forest impacts, we find an estimated mean WTP for non-donating respondents of NOK 735, while the estimated mean WTP for donating respondents is significantly higher at NOK 1265 ($t$-value = 4.14).[21]

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 when we control for self-reported altruism as well as other attitudes and individual characteristics, we explore whether past donators differ from self-reported altruists and other respondents in terms of characteristics, interests, and attitudes.

To categorise respondents in terms of self-reported altruism, we combine the three questions from Study 2 on climate forest impacts on altruism as displayed in Table 7 in Appendix 1. We define respondents as self-reported altruist if they answer "strongly agree" to at least two out of the three altruism questions and at least "agree" to a third question.[22] This categorises 177 respondents in our sample as self-reported altruists, of whom 29 are also donators, while 49 donators are not defined as self-reported altruists.

In Table 5 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,
- state a lower degree of nature relatedness,
- earn less money,

[20] One-sided two-sample $t$-test with unequal variances.

[21] One-sided two-sample $t$-test with unequal variances.

[22] 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.

**Table 5** 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 | Diff | Diff | Diff |
|---|---|---|---|---|---|---|
| | 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 |
| Interested in | | | | | | |
| 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% |
| Attitudes | | | | | | |
| 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 | | | |

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

Two sampled t-test with unequal variances. Higher education is defined as holding a Bachelor's, Masters' or PhD degree

– 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 other 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 are significantly and positively associated with WTP when we control for self-reported altruism as well as other attitudes and individual characteristics.

We apply a 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 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 in 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 is therefore excluded from the latent variable. We ran a SEM to include the latent factors as controls when examining the donators' WTP; see the diagram in Fig. 3.

Observed variables are depicted as squares, while unobservable variables are shown as ellipses. Directed arrows designate regression coefficients, and bidirectional arrows signify covariances. The latent variables are assumed to affect the indicators and log(WTP) and to be correlated. We estimate the following SEM:

$$\begin{aligned} \log(\text{WTP}) = {} & \beta_1 \text{donation behaviour} \\ & + \beta_2 \text{stated altruism} \\ & + \beta_3 \text{stated nature relatedness} \\ & + \beta_4 \text{stated envir.consciousness} + \varepsilon_1, \end{aligned} \tag{3}$$

where latent variables in (3) are measured using the indicators presented in Fig. 3. The question formulations and distributions for indicators *altr1-altr3*, *nr4-nr7* and *nep1-nep7* are presented in Appendix 1. Parameters are estimated using numerical optimisation comparing the sample covariance matrices and the estimated covariance matrices. The most widely used optimisation method is the maximum likelihood (ML) approach, but ML relies on a multivariate normality assumption which is violated when indicators are categorical. We take into account the categorical nature of our indicators and the dependent variable and estimate the parameters using the diagonally weighted least squares model (Satorra and Bentler 1994).[23] The parameters of the model to be estimated include the structural parameters and factor loadings relating observed indicators to latent variables, the measurement-error variances, the variances of the latent exogenous variables, and measurement-error covariances.

We ran two models. In Model 1, we included a dummy for the respondents who donated and controlled for the latent attitudes, as visualised in Fig. 3, while in Model 2 we also

[23] Due to few answers in one of the four categories across the indicators, we collapse the smallest categories and reduce to three categories.

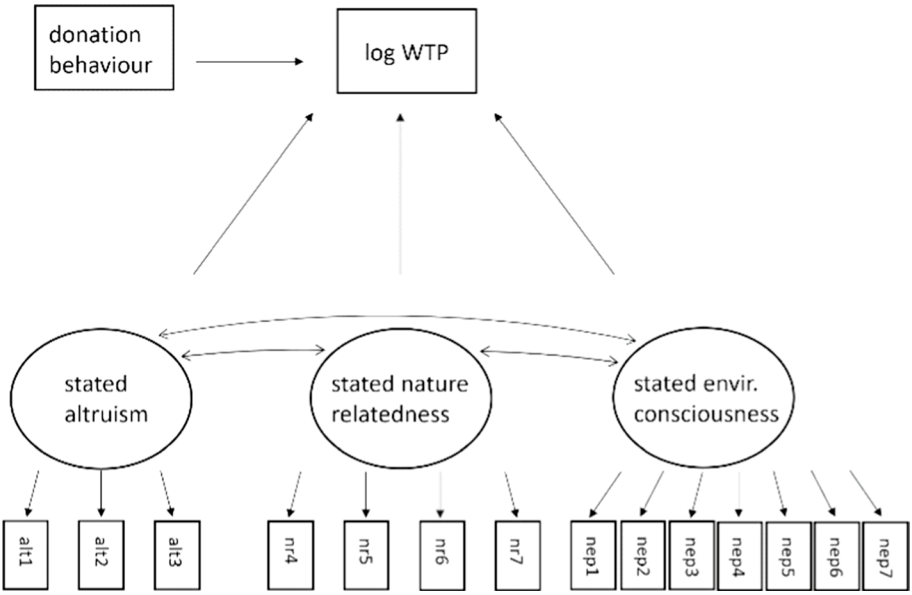



**Fig. 3** The structural equation model

included respondent characteristics as control variables. We used the log of the mid-points of the payment card cost amounts as the WTP variable, and we allowed 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 8 in Appendix 2. Table 6 presents the results of the two regressions.

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

Model 1 returns a positive and significant coefficient of 0.562 for the dummy on respondents who have donated at least once, when controlling for latent altruistic, ecological, and environmental attitudes. When we include control variables in Model 2, the dummy for donating respondents decreases to 0.521 and remains significant at the 1% 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 a good fit.[24, 25]

[24] The CFI should be greater than 0.9, ideally above 0.95, whereas RMSEA should be less than 0.06 and 0.08, respectively (Hu and Bentler 1999).

[25] We have also run models where we test for indirect effects from past donations to altruism and the other way around. These links are insignificant and model fits are reduced.

**Table 6** 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 | 0.569*** | 0.521*** |
| | (0.148) | (0.158) |
| Log income | | 0.121 |
| (per hundred thousand NOK) | | (0.137) |
| Age | | 0.009** |
| (per year) | | (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 | 0.110 |
| | (0.106) | (0.117) |
| Stated nature relatedness | 0.332** | 0.337** |
| | (0.129) | (0.277) |
| Stated environmental consciousness | −0.096 | −0.067 |
| | (0.106) | (0.158) |
| CFI (robust) | 0.978 | 0.981 |
| RMSEA (robust) | 0.051 | 0.036 |
| N | 416 | 350 |

**$p < 0.05$; ***$p < 0.01$.

WTP is the natural logarithm of the midpoint of the respondents' chosen payment value on the payment card and the next higher value. The highest category WTP is the highest value on the payment card. The models are estimated using the lavaan package in the R program. Higher education is defined as holding a Bachelor's, Masters' or PhD degree from a college or university. Standard errors are in brackets

## 5 Discussion and Conclusions

We examine the association between past donations and stated WTP in two (unrelated) CV surveys with different respondents: (1) protection of coastal ecosystem services from damage due to oil spills, and (2) impacts of climate forest planting. Our results partially confirm our first hypothesis. The respondents who have donated to a charity at least once are not significantly more inclined to state a positive WTP than other respondents in any of the studies. Thus, we find little evidence of past donations to have an effect on WTP at the extensive margin. On the other hand, past donations have substantial and significant effects on WTP at the intensive margin. Past donations predict higher stated mean WTP across CV surveys when controlling for individual characteristics. The donators in Study 1 are sensitive to scope, they significantly increase their WTP when the size of the prevented oil spill increases. This could indicate that donators in our data are motivated by pure altruism

and not warm glow due to self-signalling. Although this seems reassuring in terms of the validity of this survey and CV studies in general, we cannot conclude on the basis of these results, since the warm glow motive still might be present in donators' WTP (Chilton and Hutchinson 2000). Further, we find that the intensity of donations, meaning the more often respondents have donated and the higher share they have donated, increase the WTP at the intensive margin in Study 2.

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 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" trait and that their index contains new information not available using observable characteristics. De Oliveira et al. (2011) find that individuals who give to one organisation, give more than average to other organisations. We find, like De Oliveira et al. (2011), that donators' WTP amounts are not well explained by observable individual characteristics, but seem to correlate with latent altruistic preferences, in this case not fully captured up by self-reported altruism. Our results seem to contradict Galizzi and Navarro-Martinez (2019) and Ross and Nisbett (2011) who find that individuals' prosocial behaviour is unpredictable across decision domains.

Given that past donation behaviour is a good predictor of higher mean WTP at the intensive margin, it is surprising that past donations fail to predict higher propensity to state a positive WTP at the extensive margin, especially since stating a positive WTP resembles the donation decision. One reason for the missing association might be due to data issues; relatively few zero WTP responses and relatively few donators give too little variation to isolate the positive effect in the data. The Donator variable in Study 1 have a positive coefficient at 0.8, close to significant at the 10% level, which might indicate that there is a true but undetected positive association. However, further investigations remain to be done on how the difference in the respondents' motivations for a stating positive WTP and stating a higher mean WTP could be related to motivations associated with past donations.

Our results confirm our second hypothesis. We find past donations to predict higher mean WTP when controlling for self-reported altruism as well as other attitudes and individual characteristics.

Our results suggest that measures of self-reported altruism 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 find them altruistic. Interestingly, we find that female donators are less likely to self-report as being altruistic. This is 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 bias the WTP in CV upwards. If the donating respondents get a positive warm glow feeling from stating higher WTP in SP surveys, they will bias the mean WTP for the environmental good even in incentive-compatible surveys if they do not get a corresponding warm glow feeling when they pay their taxes.

Several studies find indications that some donators are motivated by warm glow preferences (e.g., Falk et al. 2020). Hartmann et al. (2017) find that stated warm glow has a stronger influence on WTP than stated 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 (1791) said: "Virtues are lost in self-interests as rivers are lost in the sea". Isolating, measuring, and controlling for warm glow in SP is difficult 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, a lower marginal utility of money could explain both donations and higher WTP in SP surveys, independently of altruism and warm glow preferences.

If we trust that prosocial behaviours are consistent across several decision domains, there might be new links to explore between charity donation to raise environmental engagement. As past donations to charities increase WTP for ecosystem services in our study, past donations to a charity might also indicate a willingness to engage in environmental and conservation projects too. As pointed out by De Oliveira et al. (2011), our results support list-sharing from charities towards organisations who need not share their mission per se, which is supported by Aruga (2020) who finds an association between altruism and environmental awareness. Related to this, Nelson et al. (2019) find that tourists are more willing to donate to bundled conservation issues rather than isolated issues when they explore real voluntary payments for conservation on a popular island (Nelson et al. 2019).

Future research should examine how past pro-social behaviour can be utilised to increase commitment to improve public goods and reduce public bads. Insights on why people give to charities, who they are, and how and when to approach them could be helpful to engage people in conservation and environmental issues too. Future research should also examine altruistic and warm glow preferences in welfare economics and CV studies. Combining data on (past) real donation behaviour with stated preference surveys can open new avenues for tests of altruism in preference elicitation. If donation history is not available, a possible solution would be to include a dictator game with charities as recipients in SP surveys (Umer et al. 2022). We suggest investigating whether there is a substantial difference between the motivations when choosing to state a positive WTP at the extensive margin and choosing the level of WTP at the intensive margin. Giving in the dictator game with charity as recipients provides rich information on the intensive and extensive margins of donations, which might be helpful in this regard. Different types of dictator games may also be adopted to reveal various motives such as pure and impure altruism. Giving in the standard anonymous dictator game indicates pure prosocial tendencies, whereas making donation decisions when anonymity or economic incentives are diluted may reflect impure motivations such as social desirability motivations (Engel 2011). To sum up, combining insights from experimental and behavioural economics and SP surveys could shed light on the influence of different altruistic motives affecting valuation surveys, with important consequences for estimating valid and reliable welfare measures for cost–benefit analysis.

## 6 Appendix 1: Self-reported Altruistic, Ecological, and Environmental Attitudes

Higher WTP among donating respondents could stem from altruism, ecological or environmental attitudes. Pro-ecological and pro-environmental attitudes are expected to increase WTP for measures that improve environmental quality. Altruism is also expected to increase WTP through 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 their 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 7 presents the distribution of answers.

Our statements on altruism are gathered from the German Socio-Economic Panel study (Dur and Zoutenbier 2015; 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 agrees on, while 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 respondents strongly agree 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, they might be

**Table 7** 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 |

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

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.

## 7 Appendix 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, and should stem from a single latent variable, not two or more variables. The size of the standardised factor loadings is often used to evaluate validity (Bagozzi and Yi 2012) (Table 8).

The rule of thumb is that the standardised factor loadings should exceed 0.5, and ideally 0.7 for the indicators to be highly and relatively uniformly correlated (Hair et al. 2014). Each standardized loading is above 0.5 in the measurement models, which indicates convergent validity. We would like to thank Ståle Navrud, Kristin Magnussen and Øyvind N. Handberg for contributions to the oil spill and climate forest surveys, respectively. We would also like to thank Berit Halvorsen, Arild Angelsen, Michela Faccioli and two anonymous reviewers for their valuable feedback to the paper.

**Table 8** Standardised factor loadings of measurement models

| | Stated altruism | Stated nature relatedness | Stated environmental consciousness |
|---|---|---|---|
| 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 |

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## Declarations

**Conflict of interest** The authors declare that they have no conflict of interest.



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## Authors and Affiliations

**Endre Kildal Iversen[1,6] · Kristine Grimsrud[3] · Yohei Mitani[4] · Henrik Lindhjem[2,5]**

Kristine Grimsrud
kristine.grimsrud@ssb.no

Yohei Mitani
yomitani@kais.kyoto-u.ac.jp

Henrik Lindhjem
henrik.lindhjem@menon.no

1 School of Economics and Business, Norwegian University of Life Sciences, P.O. Box 5003, 1432 Ås, Norway

2 Menon Centre for Environmental and Resource Economics, Sørkedalsveien 10B, 0369 Oslo, Norway

3 Research Department, Statistics Norway, Akersveien 26, Postboks 2633 St. Hanshaugen, 0131 Oslo, Norway

4 Division of Natural Resource Economics, Graduate School of Agriculture, Kyoto University, Kitashirakawa Oiwakecho, Sakyo Ward, Kyoto 606-8502, Japan

5 Norwegian Institute for Nature Research (NINA), Sognsveien 68, 0855 Oslo, Norway

6 SNF - Centre for Applied Research at NHH, Helleveien 30, 5045 Bergen, Norway