SELF IMAGE AND CHOICE EXPERIMENTS: HYPOTHETICAL AND ACTUAL WILLINGNESS TO PAY

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Abstract

This paper proposes that people derive utility from a positive self-image, influenced by ethical views, internal honesty, and consistency between sequential choices. A model is tested by conducting the same choice-experiment for two WWF-campaigns in three different contexts. It predicts that marginal WTP for contributions to these campaigns is highest when choices are hypothetical, lower in a real-money experiment that follows a hypothetical experiment, and lowest when real-money choices are made directly. Additionally, it predicts that marginal WTP decreases with the scale of financial incentives in a real-money experiment. The empirical results are consistent with these hypotheses.

Key words: choice experiment, self-image, hypothetical and real WTP, cognitive dissonance, environmental valuation

JEL-classification: C91, D63

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1. Introduction

What explains charitable behaviour such as contributing money to environmental projects? And what determines people's responses to anonymous hypothetical survey-questions with an ethical dimension? This paper proposes that people's real as well as hypothetical choices are influenced by the self-image that they create when making choices or statements, in addition to the real changes in money and the projected consequences. A model is tested by conducting both hypothetical and real-money Choice Experiments (CEs) for contributions to two campaigns run by the World Wildlife Fund (WWF).

A CE is a Stated Preference (SP) method where respondents make repeated choices between different bundles of goods, and/or attributes of goods. This method has received increased attention in recent years since it is considered to have some important advantages relative to the Contingent Valuation (CV) method. The CV method is the most frequently used SP method for assigning monetary values to environmental and other non-market goods (Adamowicz *et al*., 1994; 1998; Boxall *et al*., 1996).[1] The ultimate validity test of SP methods is often considered to be the extent to which statements of maximum Willingness To Pay (*WTP*) correspond to real or actual payments. However, since the basic rationale of these methods is to provide economic values when no market exists, such external validity tests are rare, and the few tests that have been performed are usually conducted on private market goods, rather than on public or non-market goods.

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[1] The validity of the CV method has been much debated (Kahneman and Knetsch, 1992; Arrow *et al*., 1993; Diamond and Hausman, 1994; Hanemann, 1994; Cummings *et al*., 1997; Loomes, 1999; Sen, 2000).

Notable exceptions are Seip and Strand (1992), Cummings *et al.* (1997) and Carlsson and Martinsson (2001).[2]

Seip and Strand asked respondents if they were interested in becoming members of an environmental organisation in Norway and, if they were, how much they would be willing to pay for an annual membership. Those who stated an amount above the actual membership fee were soon after mailed a letter from the organisation, requesting them to join. It turned out that only 6 out of 64 respondents actually decided to pay the membership fee, indicating that hypothetical *WTP* may be a poor indicator of real *WTP*.

Cummings *et al.* compared hypothetical statements with real payments in a CV study using a referendum elicitation format. The study was directed toward people who lived close to a contaminated area. The respondents were told that if everybody taking part in the study paid 10 USD, the amount of money aggregated across all individuals would be sufficient to cover the costs of producing and distributing a 'citizens' guide' that would provide valuable information regarding safe groundwater. In the hypothetical referendum 45% voted yes and 55% voted no, whereas when real-money was introduced, 27% voted yes and 73% voted no.

Carlsson and Martinsson (2001) conducted CEs for different environmental projects. Respondents first made 16 hypothetical pair-wise choices. In each choice set, the amount of money given to the respondent, and a donation to an environmental project, varied. Typically, within the same choice-set, if the amount of money given to the respondent was larger in one alternative, the donation was larger in the other. In a second round of the experiment respondents made 16 similar (but non-identical) pair-wise choices, but this

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[2] Navrud (1992) is another example, but the result of this study is difficult to interpret since no specific monetary amount was mentioned in the hypothetical context preceding actual behaviour.

time they were informed that one of these would be randomly drawn as the actual choice-set. They would accordingly be paid the amount of money that corresponded to the choice made in this particular choice set, whereas the donation would be made anonymously by the research team to the project chosen. The results indicate no significant difference between hypothetical and actual marginal *WTP (MWTP)*, although the former was slightly higher than the latter.

For some environmental goods, such as access to recreation sites or hunting rights, it is also possible to compare SP methods with revealed-preference (RP) methods, such as the travel-cost method and hedonic-pricing methods. Carson (1996) found in a comprehensive meta-analysis that the environmental values found in RP studies were of the same order of magnitude as those obtained from dichotomous-choice CV studies, and that they were actually slightly larger on average. Wardman (1988) surveyed British value-of-time studies and found similar results when comparing SP and RP studies.

Thus, given the empirical evidence reviewed here, it appears incorrect to claim that SP methods would always bias *WTP* upwards. Instead, we suggest, and later test, the following proposition: *Hypothetical WTP exceeds actual WTP in cases which involve an important perceived ethical dimension, and where a high WTP is considered ethically commendable, but not otherwise,* based on the idea that people would like to improve or maintain their self-image, and that it is more costly to do so when real money is introduced. The idea that people derive value from the mere expression of attitudes and values that correspond to what they consider to be 'good' and worthy actions is not new (Katz, 1960; Herek, 1986; Andreoni, 1989, 1990). And while still unconventional in economics, it is considered almost self-evident in social psychology that people care about their self-image (e.g. Baumeister, 1998). Here we hypothesize that the effects on

individual self-image are an important driving force for some issues, but not for others. Choices affecting animals or the environment in general, and the living conditions for future generations, are examples involving ethical considerations. On the other hand, choices concerning tradeoffs between money and travel time, and private access to hunting or skiing, appear much less related to ethics.

It should be emphasized that we do *not* suggest that self-image effects are important only for hypothetical choices. Indeed, our proposed model implies that such effects motivate people to contribute real money to environmental projects, as well as to undertake other unselfish activities. Brekke *et al*. (2002) provide a direct test of such influences. They asked about the motivation for re-cycling in Norway, and as many as 73% of the respondents agreed that one of their reasons was that they would like to see themselves as responsible people. Benabou and Tirole (2002) take our desire for a good self-image, and self-confidence, as a point of departure and discusses the instrumental value of such an image in various examples of real-life behavior.

The suggested proposition above is consistent with all the results reviewed here, except for the findings by Carlsson and Martinsson (2001), where the choices clearly involve ethical considerations and where no significant difference between hypothetical and real-money *MWTP* was found. However, their study was based on a within-subject design. A possible explanation of their results is that stated *MWTP* influences subsequent real *MWTP* positively, assuming that people would like to act consistently with respect to their previously expressed responses. This is in accordance with the theory of cognitive Dissonance (CD), pioneered by Festinger (1957), which proposes that people do not readily take inconsistent attitudinal positions, or positions that conflict with previous

behaviour.[3] We suggest that people's self-image is influenced positively by behaving consistently with previously made statements, and vice versa, based on more recent CD literature, which stresses the importance of both self-consistency and self-affirmation as driving forces of dissonance (e.g., Aronson, 1992; Steele et al., 1993). The influence of scale in real-money experiments is another controversial topic. The model proposed here predicts that the scale of the financial incentives in the experiment is important, simply because it is cheaper to buy a better self-image when the amount of money involved is small.

As mentioned, there are a number of experiments and studies on hypothetical versus real *WTP* for various *private* goods, and several of them find that hypothetical *WTP* overstates real *WTP*. For example, Cummings et al. (1995), using electrical juice-makers, chocolate bars and mini-calculators; Loomis et al. (1996), using art-prints; and Blumenschein et al. (1998), using sunglasses, all found that stated *WTP* exceeded real *WTP*. Obviously, induced self-image effects from contributing to a good social cause cannot explain this. Instead, it is plausible to suggest that hypothetical responses in these contexts largely represent latent preferences that are activated in the experiment, preferences that in a real situation are present only if the individual really wants or needs the particular product. For example, assume that a person is asked about her maximum *WTP* for a box of chocolates, despite the fact that she does not feel like eating chocolate at the time of the interview. In such a situation she would normally not even reflect over her *WTP* for a box of chocolates, so in order to make it more realistic she modifies the question to be as follows: *Given that you would like to eat chocolate right now, how much*

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[3] Since Festingers original study, CD has been replicated in a variety of contexts (*e.g.*, Freedman, 1965; Zimbardo *et al.*, 1965, Scheier and Carver, 1980).

would you be willing to pay? Similarly, most of us only reflect over a limited number of types of chocolate, and we rarely or never consider our maximum *WTP*s for other alternatives. Hence, some may modify their *WTP*s to reflect a type that they would normally consider, and consequently favour, in order to make the question more relevant to them. In addition, some respondents may anchor their responses on what they expect the market price for the good to be. Therefore, the above results are not directly comparable to the findings of this study.

The experiment in this study follows the design developed by Carlsson and Martinsson, with some important exceptions. In particular, on the basis of the above predictions we use a split-sample design that enables us to test if, and to what extent, stated *MWTP* for the environmental project influences subsequent real *MWTP*. Hence we test whether real-money *MWTP* that is not preceded by hypothetical *MWTP*, and thus having no bias arising from respondents' preferences for consistency, is lower.[4]

The remainder of this paper is organised as follows: Section 2 presents the theoretical model that incorporates self-image in the utility function. This model can be seen as a modification and extension of Andreoni's (1989; 1990) model of impure altruism.[5] Section 3 presents the hypotheses to be tested, describes how the experiments were conducted, and presents the empirical models to be estimated econometrically. Section 4 provides the empirical results, and Section 5 discusses the main findings in a broader context.

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[4] This is directly related to the validity of within-subject, as opposed to between-subject, tests of embedding in the CV literature (*e.g.*, Boyle *et al.*, 1994; Carson*.,* 1997).

[5] Andreoni's warm-glow model is also similar to the hypothesis of Kahnemann and Knetsch (1992) that people in hypothetical contexts are largely influenced by symbolic motives, and that the *WTP* provided reflects the 'purchase of moral satisfaction' for contributing to a 'good' cause.

2. The Model

2.1. The conventional model

In most SP experiments that measure the value of an environmental change, or a change in some other non-market good, respondents are (explicitly or implicitly) assumed to maximize a strictly quasi-concave utility function as follows:

$$u = u(x, G) \tag{1}$$

where $\frac{\partial u}{\partial x} > 0, \frac{\partial u}{\partial G} > 0$, and where x is private consumption, and G is quantity of a non-market or public good, such as environmental quality. The marginal willingness to pay (*MWTP*) for an increase in G is then given by the marginal rate of substitution between G and x, *i.e.*, $MWTP = \frac{\partial u / \partial G}{\partial u / \partial x}$. For a sufficiently small change in G, the average willingness to pay (*AWTP*) for an improvement will be approximately equal to the *MWTP*. Thus, the maximum *WTP* for a certain change in G, ΔG, is given by $\Delta G * MWTP$. In CEs it is often assumed that the involved changes are sufficiently small, and therefore represented by (locally) linear utility functions.

2.2. The extended model with self-image

Andreoni's (1989; 1990) model to explain charity and voluntary contributions to public goods is based on the utility function $u^i = u(x^i, G, g^i)$, where g^i is i's own voluntary contribution to the public good. Apart from the utility arising from the provision of the public good, the individual derives utility from the mere act of giving, and the effect has thus been termed the 'warm glow' of giving. Thus, the utility arising from the provision of a (public) good is higher for the individual if she contributes to the good herself, rather than if someone else pays for it. We hypothesise that the origin of these warm-glow

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feelings is due to the effects on the individual self-image. By explicitly incorporating self-image s into the model, following Akerlof and Kranton (2000, 2002), Brekke et al. (2002) and Johansson-Stenman and Martinsson (2002), [6] we now have the following utility function:

$$u = u(x, G, s) \tag{2}$$

where $\frac{\partial u}{\partial s} > 0$. The individual's self-image is naturally influenced by many factors (Akerlof and Kranton, 2000). Here we focus on: *i*) the degree to which the individual acts in accordance with her ethical beliefs, *ii*) the honesty to herself, and *iii*) the consistency between actions and previously made commitments or statements. The first element is straightforward, and there is much evidence that most people would like to see themselves as 'nice' and responsible (Akerlof and Dickens, 1982). The importance of the second element is revealed by considering the following scenario: Assume that you won 100,000 USD in a lottery, how much of this would you give away to charity? Even if we assume that the 'ethically superior' value would be all of it, *i.e.* 100,000 USD, most of us know with certainty that we would not donate everything, and hence we would feel dishonest to ourselves if we provided that answer in a survey.

The third element is related to the second. On the basis of the theory of CD and self-affirmation (Aronson, 1992), which hypothesise that people aim to possess consistent attitudes and attitudes that correspond to their behaviour, people would feel uncomfortable

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[6] Akerlof and Kranton emphasize that people have, and try to obtain, different identities, whereas the analysis here focuses on elements which presumably most people share. In the model by Brekke et al., self-image can be affected by real, and only real, actions. Johansson-Stenman and Martinsson model people's biased perceptions of their own preferences; for example, on average people seem to prefer to believe that the environmental characteristics of a car is more important to them than its status value is.

by acting against what they have said they would do. In this study we are evaluating the impact of stated economic values on subsequent behaviour, defined as actual payments in an experimental context. Modern accounts of CD theory assume that some necessary auxiliary conditions must be fulfilled; *freedom of choice*, *adversive consequences*, and *commitment* (Eagly and Chaiken, 1993). Arguably, these basic conditions of dissonance arousal are fulfilled in within-subject tests of stated preferences in CEs; respondents are free to make their own choices, they are committed to their hypothetical responses in the sense that these statements cannot be altered within the experimental context, and choices involving actual payments are consequential.

The model can be formalized in different ways. In the experiment we are interested in the individual tradeoff between money given to herself, and money given to a good cause (the WWF-campaigns); how much money to either of the campaigns is needed to compensate for one dollar *not* given to the individual? It is then natural to estimate self-image as a function of marginal (or average)[7] *WTP*s as follows:

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s = f\left(\left|MWTP^{stated} - MWTP^{moral}\right|, \left|MWTP^{stated} - MWTP^{true}\right|, \left|MWTP^{stated} - MWTP_{t-1}^{stated}\right|\right) \tag{3}
$$
$$
\equiv f(d_1, d_2, d_3)
$$

where $\frac{\partial f}{\partial d_1} < 0, \frac{\partial f}{\partial d_2} < 0, \frac{\partial f}{\partial d_3} < 0$, and where $MWTP^{stated}$ is the stated (or revealed) *MWTP* in the experiment for a certain change in *G*; $MWTP^{moral}$ is the ethically superior value, or the value which would give the respondent the best self image if there were no conflicts with other determinants of the self image; $MWTP^{true}$ is the *MWTP* that keeps individual well-being constant while ignoring the effect of self-image; and $MWTP_{t-1}^{stated}$ is a previously

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[7] We assume that respondents cannot distinguish between effects from average and marginal *WTP* on their self-image in the interval considered. It is convenient here to work with marginal *WTP*.

stated *MWTP*. In other words, $MWTP^{true}$ is the amount of money that could be taken away from the individual per dollar given to the good cause *by someone else*. For a good involving ethical considerations it follows that $MWTP^{moral} > MWTP^{true}$.

2.3. Hypothetical WTP

In the conventional model, which ignores the impact of self-image, it is implicitly assumed that respondents in CEs will reveal their true preferences, although the model itself gives no explanation as to *why* people in a hypothetical choice experiment would do so. One can argue that when individuals have no incentive for not stating their 'true' preferences, it is likely that they will tell the truth. However, Cummings *et al.* (1997) argue that such "epsilon truthfulness" is a very strong assumption that lacks empirical support. Here we assume that people are motivated by several internal forces, of which honesty is only one.

If respondents know that the survey is hypothetical, they also know that *x* and *G* are unaffected by their choices. Consequently, utility maximization is reduced to the maximization of self-image *s*. In cases where the ethical dimension is unimportant, such as in value-of-time studies, we have $\dfrac{\partial f}{\partial d_1} \dfrac{\partial d_1}{\partial MWTP_{hyp.}^{stated}} = 0$. If no earlier commitment or

statement is made we also have $\dfrac{\partial f}{\partial d_3} \dfrac{\partial d_3}{\partial MWTP_{hyp.}^{stated}} = 0$. This implies that *s* is maximized

when $MWTP_{hyp.}^{stated} = MWTP^{true}$, *i.e.*, the optimal response is to answer 'truthfully'.

When valuing the environment, on the contrary, the perceived ethical dimension is often important, and we have $\dfrac{\partial f}{\partial d_1} < 0$. Assuming again that no earlier commitment or

statement is made, s is maximized for the WTP^* when $\frac{\partial f}{\partial d_1} = \frac{\partial f}{\partial d_2}$, assuming an interior

solution. Thus, the optimal response implies a trade-off between the ethically superior

value and internal honesty. From the mean value theorem we then find

$MWTP^{true} < MWTP_{hyp.}^{stated} < MWTP^{moral}$.

2.4. Real WTP

In a question involving real money, and a real change in G, the respondent maximizes the

following utility function

$$u = u\left(x, G, s(MWTP_{real}^{stated})\right) = u\left(x^0 + \Delta x, G^0 + \Delta G, s(MWTP_{real}^{stated})\right) \tag{4a}$$

where $MWTP_{real}^{stated}$ is the implicit $MWTP$ obtained in the experiment with real money, x^0

and G^0 are initial individual income (or wealth) and (overall) revenues for the WWF

project, respectively, and where Δx and ΔG are the corresponding increases due to the

choice experiment. The higher the chosen ΔG, the lower the obtained Δx is, and vice

versa. Although the choices are of course discrete in the CE, we will, for analytical

simplicity, model the amount of money foregone by the individual as $f(\Delta G)$, so that

$\Delta x = T - f(\Delta G)$ where the experiment is designed so that $f > 0, f' > 0$, and where T is

the maximum money transfer to the respondent. The marginal (or average) WTP in the

interval is then given by $f(\Delta G)/\Delta G$, and since $f' > 0$ a higher ΔG also implies higher

marginal and average WTP. We can then re-write the utility function to be maximized as:

$$u = u\left(x^0 + T - f(\Delta G), G^0 + \Delta G, s(f(\Delta G)/\Delta G)\right) \tag{4b}$$

The problem, as formulated, is to choose ΔG, i.e., how much money should be given to

the WWF project. The more that is given, the less money the respondent receives herself,

and the higher the achieved self-image, provided that the ethically superior *MWTP* is higher than the respondents true *MWTP*. We have the following f.o.c.:[8]

$$-\frac{\partial u}{\partial x} f' + \frac{\partial u}{\partial G} + \frac{\partial u}{\partial s} \frac{ds}{dMWTP_{real}^{stated}} \left(\frac{f'}{\Delta G} - \frac{f}{\Delta G^2} \right) = 0$$

or

$$\frac{-\dfrac{\partial u}{\partial x} f' + \dfrac{\partial u}{\partial G}}{f' - \dfrac{f}{\Delta G}} \Delta G + \frac{\partial u}{\partial s} \frac{ds}{dMWTP_{real}^{stated}} = 0 \qquad (5)$$

Equation (5) reflects a tradeoff between self-image effects of a higher *MWTP* and real changes in *G* and *x*. Since the second term is positive, the first term is negative.[9] *u* is clearly monotonic in *s*, and *s* is monotonic in *MWTP* in the relevant interval given that we have an ethically important good, so that $MWTP^{moral} > MWTP^{true}$. Hence, we can conclude from the mean-value theorem that hypothetical *MWTP* will exceed real-money *MWTP*.

The Influence of Scale

Consider now the effects of scale. In the second term of the equation, reflecting effects on self-image, there is no direct influence from scale, so that just doubling all monetary values in the experiment would not affect self-image, provided that the respondent made the same choices as those made in the original scale. In the first term, however, the factor ΔG will reflect scale. Consider the limit-case where ΔG goes to zero, implying that the

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[8] Remember that the changes are considered sufficiently small so that the *MWTP* is constant in the interval and hence equal to the *AWTP*.

[9] Since $f' > 0$ we have $f' - \dfrac{f}{\Delta G} > 0$.

first term vanishes relative to the second term, and the results converge to the hypothetical case.

Real money directly, versus real money after a hypothetical experiment

As in the hypothetical case, the factor $\dfrac{ds}{dMWTP}$ can be separated into different elements. In the case where respondents have not undertaken a previous hypothetical experiment we have

$$\frac{-\dfrac{\partial u}{\partial x}f' + \dfrac{\partial u}{\partial G}}{f' - \dfrac{f}{\varDelta G}}\varDelta G + \frac{\partial u}{\partial s}\left(-\frac{\partial f}{\partial d_1} + \frac{\partial f}{\partial d_2}\right) = 0 \tag{6a}$$

and if they have we have instead

$$\frac{-\dfrac{\partial u}{\partial x}f' + \dfrac{\partial u}{\partial G}}{f' - \dfrac{f}{\varDelta G}}\varDelta G + \frac{\partial u}{\partial s}\left(-\frac{\partial f}{\partial d_1} + \frac{\partial f}{\partial d_2} + \frac{\partial f}{\partial d_3}\right) = 0 \tag{6b}$$

Since $\dfrac{\partial f}{\partial d_3} < 0$ we find, again by the mean-value theorem, that *MWTP* is expected to be higher if the respondent has participated in an earlier hypothetical experiment.

3. Experimental Design and Method

3.1 Hypotheses to be tested empirically

From the theoretical model including self-image a number of hypotheses were derived:

H1:   Hypothetical *MWTP* is predicted to exceed real-money *MWTP*.

H2:   The *MWTP* from the real-money experiment that follows the hypothetical

experiment is predicted to be below the hypothetical *MWTP*, but above the real-

money *MWTP* provided by respondents who have not undertaken a hypothetical

experiment before.

H3:   When comparing different real-money experiments it is predicted that the *MWTP*

would decrease with the actual amount of money involved.

These hypotheses can be contrasted against the standard model that neglects the influence

of self-image, where instead *MWTP* would be predicted not to vary with respect to the

above circumstances. In the following section we describe the experimental design in

order to test hypotheses *H1-H3*.

3.2 The experiments

The experiment was conducted at the London School of Economics (LSE) in February

2000 and November 2001. It was first announced in association with class-teaching, and

students interested in participating were later contacted by e-mail in order to arrange a date

and time for the experiment. The subjects were divided into two sample groups.

Respondents in the first of these made hypothetical choices followed by choices that

involved real payments, whereas in the other sub-sample respondents made real choices

directly with no preceding hypothetical choices. In each of these settings, hypothetical

conditions, real conditions subsequent to hypothetical, and real conditions not preceded by

hypothetical, the subjects were faced with 16 choice sets that were identical across all

settings. Thus, a design is applied that allows us not only to test the correspondence

between hypothetical and real choices, but also to investigate the influence of the former

on the latter, that is, to what extent individuals try to act in an internally consistent way in these contexts. The diagram below illustrates how the two samples were constructed.

Sample group 1:

| Hypothetical Choices | → | Real choices |

Sample group 2:
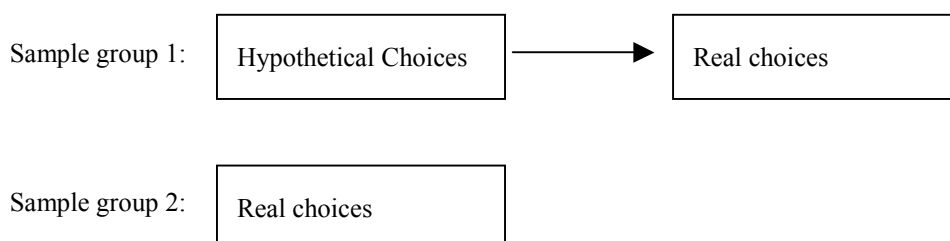
| Real choices |

Altogether 70 (mainly graduate) students from various courses were recruited of which 35 subjects first made hypothetical choices, followed by choices involving real money. The remaining 35 subjects made real choices directly, i.e. they made choices that were not preceded by hypothetical choices. The experiment was conducted in 6 sessions with 10-15 subjects in each session. All sessions were run within the same week, and the sessions with respondents who made both hypothetical and real choices were run first in order to avoid rumours about the purpose of the experiment. The sub-samples were very similar in terms of identifiable characteristics such as education, gender and age. A larger sample would obviously have been preferable, but since the experiments involved real money financial constraints imposed restrictions.

Each session started by asking some questions about socio-economic characteristics. The subjects then received verbal and written instructions regarding the choice experiment. The instructions included some brief information about the general purpose of this type of procedure (*i.e.*, estimation of economic values to inform policy analysis), the nature and purpose of the environmental projects, and finally how the choice experiment works. The particular environmental projects chosen were two campaigns currently run by

the World Wildlife Fund (WWF). In the hypothetical setting the instructions additionally read;

> *The choices are hypothetical but it is still very important that you answer them truthfully and as if they involved real money*

and

> *There are altogether 16 choices for you to make. Try to consider each of these in isolation as if that was the only choice you have to make. If you want, you may go back and change your earlier answers after second thoughts.*

The latter information was given in order to reduce order and learning effects. In the real conditions that were introduced after these choices, the subjects were given the following information:

> *In the following you will be presented similar choice situations as before, although now your choices will in fact determine how much money you earn in this experiment, as well as how much money is contributed to the campaigns. It thus involves real money. The procedure is the following:*
> *- you will again make 16 pair-wise choices*
> *- afterwards one of these will be drawn randomly as the actual choice set*
> *- you will be paid the amount of money according to the alternative chosen in this particular choice set, whereas the corresponding contribution is paid anonymously by us to the WWF*
> *Thus, your choices will determine how much money you earn in this experiment, as well as how much money is contributed to the campaigns. If you want you may go back and change earlier answers after second thought.*

Essentially the same information was presented to the other sub-sample that were faced with real choices directly.[10]

In order to examine the influence of scale, four subjects from the sample who made real choices (not preceded by hypothetical ones) were contacted a few weeks later.[11] These respondents repeated the same task, only this time they were informed that each choice set will determine the donation and income earned, rather than one randomly drawn. Hence, the total donation possibly made, and the money possibly earned by each subject is now substantially higher than in the original setting. Since the degree of anonymity would naturally be lower in an experiment involving only four subjects, we performed this follow-up experiment on the Internet through attached documents. In this way, we believe, the potential 'non-anonymity-bias' is largely reduced.

In each choice-set in all experiments, the subjects were asked to choose between two alternatives. Each alternative was characterised by three attributes; the amount of money that they themselves would receive (money), the size of the donation paid to the particular campaign run by the WWF (donation), and the type of campaign. The amount of money paid to the respondents had four levels, as did the donation, and there were two different campaigns to choose from. Both campaigns are currently run by the WWF in order to protect endangered wild animals. This was also explained to the respondents. Thus, we may argue that the scenario was perceived as feasible and fairly realistic.

The issues may further be considered as public goods, since they are not associated with belonging to the WWF, and there are no particular side-benefits associated with the

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[10] By essentially we mean except from words such as 'again', 'as before', etc., since in this case the subjects had not made any hypothetical choices previously.

[11] Again for financial reasons, since the amount of money is here considerably larger.

donations. Still, in order to minimise the impact of any possible private-good characteristics, it was also stressed that the donations would be paid to the WWF anonymously by the research team. The respondents would receive evidence through copies of the receipt of *the whole* donation (including all respondents), but not any evidence or receipt of *their own* contribution. After the experiment was finished, all respondents left the class-room and were called back in one by one and the draw was made that decided how much each individual should be paid, the size of the donation, and to which campaign. The draw was made under the supervision of the respondent due to be paid, but no one else. Table 1 below summarises the levels of attributes applied in the experiment.

Insert Table 1 about here

Given these levels, a full factorial design has 32 combinations of attribute levels. To establish an efficient design using 15 choice sets we largely relied on the search algorithm suggested by Zwerina *et al*. (1996). They identify four criteria of an efficient design: orthogonality, level balance, utility balance, and minimal overlap. We placed emphasis on the former three. The attribute levels were tested in two rounds prior to the experiment, involving 14 respondents in total. We added one choice set in order to test for consistency by repeating one of the original choice sets in the reverse order (*i.e.*, alternative *A* becomes alternative *B* and vice versa). An example of a choice set is presented below.

Insert Table 2 about here

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Real choices that follow the hypothetical ones were presented in a randomly different order. For half the respondents, the order of the choice sets was reversed, making it possible to test for order effects.

3.3 The empirical model

In the empirical analysis we use a standard random-utility framework (McFadden, 1974). The model is based on the assumption that, between 2 alternatives $A = 0,1$, the individual chooses the alternative with highest utility. Apart from a systematic part of the utility function, *V,* there is a random term, ε, so that the utility derived for individual *i* from choosing alternative 1 becomes

$$u_{i1} = V_{i1} + \varepsilon_{i1} \tag{7}$$

The probability of choosing alternative 1 equals the probability that the utility from this alternative is greater than the utility of alternative 2. Hence we have

$$\Pr(A_i = 1) = \Pr(V_{i1} + \varepsilon_{i1} > V_{i2} + \varepsilon_{i2}) = \Pr(\varepsilon_{i1} - \varepsilon_{i2} > V_{i2} - V_{i1}) \tag{8}$$

The systematic part of the utility function (or the reduced form of the utility function) is assumed to be linear in the attributes, in the interval considered:

$$V_{i1} = \alpha + \beta^x x + \beta^E D^E + \beta^T D^T + \beta^z z_i (D^E + D^T) \tag{9}$$

where D^E and D^T are the donations given to the Elephant and Turtle projects, respectively, and where *z* is a vector of dummy variables. This formulation is very similar to the one recently used by Goeree et al. (2002), with the main difference being that they did not consider donations to a good cause, but rather payoffs to themselves and others in a public-good game. The marginal, or average, *WTP* for a change in one of the donations, say to the elephant campaign, is then equal to

$$MWTP_i^E = AWTP_i^E = \frac{\partial u_i / \partial D^E}{\partial u_i / \partial x_i} = \frac{\partial V_i / \partial D^E}{\partial V_i / \partial x_i} = \frac{\beta^E + \beta^z z_i}{\beta^x} \tag{10}$$

so that in the base case, where all dummy-variables are zero, $MWTP^E = \beta^E / \beta^x$. Given such a utility function, and that the error terms of (7) follow a type 1 extreme-value distribution implying that the differences between the error terms in (8) are logistically distributed, the probability of choosing alternative 1 becomes

$$\Pr(A_i = 1) = \frac{\text{Exp}\!\left(-\beta^x(x_1 - x_0) - (\beta^E + \beta^z z_i)(D_1^E - D_0^E) - (\beta^T + \beta^z z_i)(D_1^T - D_0^T)\right)}{1 + \text{Exp}\!\left(-\beta^x(x_1 - x_0) - (\beta^E + \beta^z z_i)(D_1^E - D_0^E) - (\beta^T + \beta^z z_i)(D_1^T - D_0^T)\right)} \tag{11}$$

The alternative which included a donation to the elephant campaign is always modelled as $A = 1$, and vice versa, implying

$$\Pr(A_i = 1) = \frac{\text{Exp}\!\left(-\beta^x(x_1 - x_0) - (\beta^E + \beta^z z_i)(D_1^E - D_0^T) - (\beta^E - \beta^T)D_0^T\right)}{1 + \text{Exp}\!\left(-\beta^x(x_1 - x_0) - (\beta^E + \beta^z z_i)(D_1^E - D_0^T) - (\beta^E - \beta^T)D_0^T\right)} \tag{12}$$

The parameters associated with this model can be estimated with a standard logit model. Since the utility function (9) is invariant to any monotonic transformation, multiplying all parameters with any positive constant leaves the relevant information of the utility function unchanged. What matters instead is the *relative* size of the parameters. Dividing through by β^x then directly gives the *MWTP*, and the *MWTP* differences associated with different dummy-variables and subsamples, as well as for different projects. Thus, this formulation enables us to estimate the *MWTP*s for the elephant project, and the *MWTP*-difference between the elephant and turtle projects (implicitly assumed to be independent of the dummy-variables), as well as the difference in *MWTP* (implicitly assumed to be the same for the projects) due to the dummy variables reflecting gender and experimental context.

4. Results

4.1. Real Versus Hypothetical MWTP

Table 3 below presents the estimated logit parameters associated with the three experiments based on (1) Hypothetical choices, (2) Real-money choices after the experiment with hypothetical choices, and (3) Real-money not preceded by hypothetical choices.[12]

Insert Table 3 about here

As expected, the parameter estimates for marginal utility of income are positive and significant at the 1% level across all models, and (apart from in one case) the same holds for the marginal utility of contributing to the (elephant) campaign. Several parameters reflecting the interaction effects associated with various sub-samples are also significant. Since it has been suggested that individual error terms are likely to be larger within a hypothetical context, a heteroscedastic pooled model was run, where the variance in each sample is allowed to differ. However, the heteroscedasticity parameters are not significant, and the other parameter estimates are almost identical to the homoscedastic model.

However, what we are intrinsically interested in is not the logit estimates per se, but the *MWTP*s for different sub-samples. The *MWTP* for an elephant-project donation, given

that the dummy-variables reflecting the experimental context and gender are zero, is given by β^E/β^x. Similarly, the *MWTP* difference between the elephant and the turtle projects is given by $(\beta^E - \beta^T)/\beta^x$, and between women and men by $(\beta^E - \beta^T)/\beta^x$. These are easy to calculate directly from Table 3, and they are reported in Table 4. However, the corresponding distributions, and hence statistical significance, are somewhat less straightforward to obtain, since these are calculated based on the ratio of two non-identical and non-independent distributions. To calculate the *t*-values of the *MWTP*s, and the changes in *MWTP* associated with different variables and samples, we used the delta method; see e.g. Greene (2000).

Insert Table 4 about here

The *MWTP* for the elephant campaign is statistically different from zero at the 0.01 level for men in all samples. In accordance with *H1*, and *H2*, the *MWTP* (for men) is highest in the hypothetical context, lower in the real-money experiment that was followed by the hypothetical experiment, and lowest in the real-money experiment that was not preceded by any hypothetical choices.[13] From the pooled model, where real choices not preceded by

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[12] Ten subjects had lexicographic preferences in the intervals presented in at least one of the contexts; 6 subjects always went for the highest WWF donation, and 4 subjects always chose highest income given to them. Following Carlsson and Martinsson (2001) we have chosen to include these observations in the analysis. Nevertheless, models excluding these observations were also run, with no alterations to our main results. Furthermore, five subjects had inconsistent preferences within any of the three contexts, of which one was inconsistent in both the hypothetical and the subsequent real-money experiment. The latter individual is excluded from the analysis, leaving us with 69 respondents in total.

[13] Also for women, the *MWTP* from the hypothetical experiment is higher than that of the two real-money contexts. However, here the difference between the two real-money contexts is small.

hypothetical choices are set as the benchmark, we find that *MWTP* differs between the samples in the expected direction according to *H1* and *H2*, but where the latter difference is statistically significant only at the 10% level. We also ran a model in order to test whether *MWTP* differs significantly between the hypothetical context and the real-money context introduced after hypothetical choices were made (not presented in table 4). This difference was found to be significantly different from zero at the 5 percent level. Finally, the differences in *MWTP* between the two campaigns are small and poorly significant.

Women turned out to provide a much higher *MWTP* across all contexts,[14] supporting the experimental results by Eckel and Grossman (1998) who found that women tend to contribute more to public goods. Indeed, women's *MWTP* is larger than one in the hypothetical context, implying that women would prefer one additional dollar to be given to the WWF-project instead of one additional dollar to them. Brown and Taylor (2000) found in a CV study that men on average had a much higher 'hypothetical bias', but this is not supported by our results. The hypothetical *MWTP*s must be considered to be rather high also for men, although it appears reasonable that people give a higher weight to contributions to a good cause such as a WWF projects, compared to the payoffs to other participants in a public good game. Goeree et al. (2002) found from analysing such games that people's *MWTP* for increasing the payoffs of others to be about 0.1 on average. The difference between our results, and the ones by Goeree et al., is also consistent with the finding of Eckel and Grossman (2001) that proposers in a dictator game gave more to the Red Cross than to other experimental subjects.

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[14] Parameters for other socio-economic variables, such as age and income, were never significant. This may be explained by the limited variation in these variables in the student sample. Further, to test for possible

In addition to the dummy-parameter test, we perform likelihood-ratio tests of pooled (across contexts) and restricted models, with test statistics presented in Table 5 below.[15] As shown, we can reject the hypothesis that the parameter estimates of the hypothetical and real-directly contexts come from the same population at the 1% level. Further, contrary to the results by Carlsson and Martinsson (2001), we can also reject (at the 1% level) the hypothesis that the parameter estimates of the real choices made after hypothetical choices come from the same population as the hypothetical choices, whereas the same can be rejected at the 10% level for the two real-money experiments. This suggests that within-sample tests may be poor indicators of external validity.

Insert Table 5 about here

4.2.   The Influence of Scale

For financial reasons we were not able to run a large-scale experiment using substantially larger amounts of money.[16] Nevertheless, on the basis of our results, we can still discuss *theoretically* the implication of the scale of financial incentives, and the possibility that the standard model measures individual welfare correctly in real-money experiments not preceded by hypothetical choices. A standard assumption is that the utility is strictly quasi-concave in private money and the public good. This implies that the indifference

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order effects, a dummy variable was introduced for 1 of 2 different orders (not reported in Table 3), but the corresponding parameter was never significant at the 0.10 level.

[15] Likelihood ratio test: $\lambda = -2\left[\ln L_{pooled} - (\ln L_{restricted1} + \ln L_{restricted2})\right] \sim \chi^2$

[16] Even so, out of curiosity, four respondents were followed-up with real-money choices involving much larger monetary incentives. Two respondents became much less altruistic, while the remaining 2 respondents did not behave very differently compared to the case with smaller amounts of money.

curve in *x-G* space is convex towards the origin, so that an individual will always require more in compensation for a given reduction in *G* at a lower level of *G*, compared with a higher level. In our case, the estimated *MWTP* for women is 0.91, so that an individual at the margin is indifferent between receiving 0.91 dollars herself and that 1 dollar is given to the WWF-project.

Consider an example where the overall budget of the WWF elephant project is equal to 1 million USD. After the CE is conducted, the main donors decide, for whatever reason, on a budget cut of 1%, or 10,000 USD. Given quasi-concavity of the utility function, this implies that an individual with an initial *MWTP* equal to 0.92 would receive a higher utility from the fact that an anonymous individual donates 10,000 USD to the project, than the fact that 9,000 USD is given to her.[17] This appears highly implausible, and one would expect that the *MWTP* would decrease with the amount of money involved (at least for sufficiently high amounts). It therefore seems that not only do hypothetical experiments fail to estimate individual welfare effects appropriately when important ethical values are involved, but that the same applies to real-money experiments, although to a lower extent.

5. Discussion and Conclusions

A frequent criticism of SP methods as a tool to value changes in public and non-market goods is that, due to their hypothetical nature, such approaches are likely to result in over-

estimation of the (e.g. environmental) benefits. The empirical results of such tests differ, however, and it appears incorrect to conclude that using a hypothetical survey-method would always overstate 'true' benefits. Here we have developed a model in which people derive utility from their self-image, which depends on the degree to which the individual acts in accordance with her ethical beliefs, the honesty to herself, and in accordance with earlier made statements. In this model, people have an incentive to overstate their true *MWTP* if a high value is in accordance with the respondents' ethical views, but not otherwise. The model also predicts that, due to the desire to behave consistently toward previously expressed responses, people's *MWTP* in real-money experiments is affected upwards by previously stated high *MWTP* in a hypothetical experiment. Finally, the model hypothesizes that the scale of monetary incentives is important in real-money experiments, basically because it is 'cheaper' to buy a generous self-image when the amount of money involved is small.

The results are consistent with these theoretical predictions. This does not, of course, preclude the idea that people's behavior may also be influenced by other motives. We have nevertheless shown that the results are incompatible with the conventional model typically used in the environmental valuation literature. We have also provided arguments from social psychology that the proposed model appears reasonable. One implication of the study is that within-subject tests of SP methods are in general not appropriate for examining external validity. Furthermore, and more importantly, not even real-money

[17] Formally we find that $u(x^0 + EV, G^0 - 10,000) = u(x^0, G^0)$, where *EV* is the equivalent variation, or the minimum compensation, that is needed for not making the improvement in *G*. Due to quasi-concavity we

experiments (not preceded by hypothetical choices) seem to reflect people's utility as a measure of well-being properly when the good to be valued has a strong ethical dimension, and when the financial incentives in the experiment differ from a real-world situation. In such situations, people still have an increased incentive to 'buy' an improved self-image by providing a larger *MWTP*.

When explaining survey-responses associated with so-called non-use values in the environmental valuation literature the most common addition to the standard model is based on either pure (solely utility-based) or paternalistic (*e.g.*, environment-focused) altruism (Hanemann, 1994; McConnell, 1997). However, such models cannot explain the results obtained here since there is nothing in these assumptions that would explain either the deviation between real and hypothetical WTPs, or the influence of previously expressed preferences. The same applies to the motives of commitments (Sen, 1977) and genuine altruism (Edwards, 1992; Johansson-Stenman, 1998), where it is assumed that people do *not* solely maximize their own utility, but also consider other elements, such as others' well-being, as intrinsic motives of their actions. Further, our results are also in line with Russel et al. (2003), which found that many people were willing to pay a substantial amount of money to preserve a certain public park, and that these WTPs could easily be triggered by different framings and wordings. It appears likely that these triggers work partly through people's self-images.

Our results can also be discussed in the light of the rapidly growing experimental-economics literature on social preferences, that is, preferences that can explain the often

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find that $EV = - \int_{G^0-10,000}^{G^0} \frac{dx}{dG}\bigg|_{u=u^0} dG > -10,000 \frac{dx(x^0, G^0)}{dG}\bigg|_{u=u^0} = 4,400$, since the slope of the indifference

curve is flattest in the interval at (x^0, G^0).

large observed departures from pure self-interest in terms of monetary payoffs. For example, Fehr and Schmidt (1999), Bolton and Ockenfels (2000) and Andreoni and Miller (2002) argue in favour of various forms of difference or inequality aversion to explain observed behaviour in ultimatum or dictator games and other related experiments. Rabin (1993), Bolton and Ockenfels (2000), Fehr and Gächter (2000) and Charness and Rabin (2002) argue, based on similar experiments, that fairness and reciprocity are also important factors. Based on the model set out here, in which self-image is an argument in the utility function, both these explanations appear reasonable. Presumably, most people would like to see themselves as defenders, or at least supporters, of fairness, and many people probably find it more pleasant being in favour of equality, rather than inequality. Hence, they would be willing to give up resources to maintain or improve their self-image in these respects.

However, one implication of the proposed model is that the influence of social preferences (fairness, equality etc.) may be exaggerated in these experiments, even though they involve real money, since the money involved is typically small, implying that the price of following appealing or socially desirable principles is low. This can be compared with existing empirical evidence: Slonim and Roth (1998) found that rejection rates in an ultimatum bargaining game became less frequent as stakes were raised, whereas proposals in conditions with significantly larger amounts declined as subjects gained experience. Forsythe et al. (1994) similarly demonstrate that higher stakes lead to more self-interested offers in dictator games. These studies thus indicate that larger economic incentives tend to reduce the degree of generosity among respondents, although there are also studies where larger economic incentives have little or no effect. In any case, further studies are

warranted in order to investigate the impact of financial incentives on the expression of social preferences as such more closely.

Apart from the effects tested here, the experimental situation *per se* may also induce people to think in terms of "what kind of person am I?" to a greater extent than they would otherwise do. It is also found that people are much more generous with money that they were given before the experiment, than with their own money or if they have worked or performed some task to deserve the money (e.g. Cherry et al. 2002).[18] Results from experiments that use foregone gains as incentives may therefore not always be possible to generalize.

We are most sympathetic to developments in economics that consider various kinds of unselfish behaviour more seriously, and there is much evidence that people are not as selfish as the standard models predict. However, at the same time, they may not be *as* unselfish, or concerned with principles of fairness and inequality, as some recent experimental results seem to suggest.

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[18] This relates to the more general finding that opportunity costs are often valued substantially lower than equivalent out-of-pocket costs, which may partly be explained by asymmetric valuation of gains and losses (Kahneman and Tversky, 1979).

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Table 1: Level of attributes

Money	Donation	WWF campaign
£0	£0	The African Elephant
£5	£7	The Green Sea Turtle
£10	£14	
£15	£21	

Table 2. Example of a choice set

Choice number 3	Alternative A	Alternative B
Money given to you	5	10
Contribution to campaign	14	7
Campaign	Elephant	Sea Turtle

Table 3. Estimated logit parameters associated with different samples. *t*-statistics are presented in parenthesis.

Parameter	Hypothetical	Real after hypothetical	Real directly	Pooled sample	Pooled sample Heteroscedastic
β^x	0.151***	0.155***	0.153***	0.152***	0.153***
	(7.31)	(7.68)	(7.50)	(12.97)	(12.50)
β^E	0.097***	0.087***	0.036**	0.046***	0.046***
	(5.54)	(5.20)	(2.35)	(4.14)	(4.07)
$\beta^E - \beta^T$	-0.010	-0.003	-0.014*	-0.009*	-0.008
	(-1.09)	(-0.32)	(-1.66)	(-1.77)	(-1.57)
$\beta^{Female} - \beta^{Male}$	0.105***	0.056***	0.104***	0.088***	0.088***
	(5.27)	(3.23)	(6.21)	(8.56)	(8.65)
$\beta^{Hyp} - \beta^{Real}$				0.060***	0.060***
				(4.76)	(4.78)
$\beta^{Real\,after\,hyp} - \beta^{Real}$				0.020*	0.020*
				(1.69)	(1.67)
Heteroscedasticity parameter: *Hypothetical*					0.0003
					(0.04)
Heteroscedasticity parameter: *Real after Hypothetical*					0.0043
					(0.61)
Log-likelihood	-276.09	-302.73	-307.88	-889.89	-889.73
Statistical observations	510	510	525	1545	1545

Note: ***, ** and * denote significance at the 0.01 level; 0.05 level and 0.1 level, respectively.

Table 4. Calculated *MWTP*s associated with different samples; t-values presented in parenthesis are obtained through the delta method.

Parameter	Hypothetical	Real after hypothetical	Real directly	Pooled sample	Pooled sample Heteroscedastic
$MWTP^{Elephant}$	0.64***	0.56***	0.23***	0.30***	0.30***
	(7.05)	(6.60)	(2.78)	(4.64)	(4.65)
$MWTP^{Elephant} - MWTP^{Turtle}$	-0.06	-0.02	-0.09*	-0.06*	-0.05
	(-1.08)	(-0.32)	(-1.64)	(-1.76)	(-1.55)
$MWTP_{Female} - MWTP_{Male}$	0.70***	0.36***	0.68***	0.58***	0.57***
	(4.90)	(3.12)	(5.33)	(7.86)	(7.59)
$MWTP_{Hyp} - MWTP_{Real}$				0.39***	0.39***
				(4.63)	(4.57)
$MWTP_{Real\ after\ Hyp} - MWTP_{Real}$				0.13*	0.13*
				(1.68)	(1.65)

Note: ***, ** and * denote significance at the 0.01 level; 0.05 level and 0.1 level, respectively

Table 5. Likelihood ratio tests of pooled and restricted models

Model comparison	Test statistics	
Hypothetical *vs* Real after hypothetical	$\chi^2_4 = 13.84$	p<0.01
Hypothetical *vs* Real directly	$\chi^2_4 = 23.36$	p<0.01
Real after hypothetical *vs* Real directly	$\chi^2_4 = 8.08$	p<0.1