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A DIRECT TEST OF SOCIALLY DESIRABLE RESPONDING IN CONTINGENT VALUATION INTERVIEWS

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A direct test of socially desirable responding in contingent valuation interviews

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1. Introduction

The contingent valuation method (CVM) has become one of the major tools for the assessment of the social value of public projects in the environmental sector. This information is needed by policy makers in order to contrast the costs of environmental policy measures with their overall social benefits. Such a cost-benefit analysis is the precondition for making rational decisions on the use of public funds, i.e. government should only implement those public projects the social benefits of which exceed their costs. Yet, since environmental goods (or at least many benefits they provide such as ecosystem services, clean air, or aesthetic values) are typically not traded in markets, standard market prices cannot be used for their valuation. Instead, other techniques have been devised, such as the CVM.

This approach is basically a survey technique that employs interviews to elicit individual evaluations of (public) environmental goods (Carson and Hanemann 2005, Mitchell and Carson 1989). These valuations are typically expressed as the maximum amount of money that an interviewed household is willing to pay for the possibility to enjoy the benefits of an environmental good or for the realization of the public project which brings forth this good. This project as well as the relevant features and expected benefits of this policy measure are introduced in the scenario.

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The willingness to pay (WTP) statements for the support of the public project made by the households are interpreted as indicators of the individual utility changes accruing from these benefits. These WTP statements can be used to calculate the overall change in social welfare induced by the project. Therefore, the mean WTP of a sample of households, which is representative of the overall population affected by that public project, is multiplied by the total number of households in that population.

However, the validity of the welfare estimates resulting from this approach is still fervently debated because such surveys suffer from certain methodological problems (cf. Venkatachalam 2004). One major procedural shortcoming of the CVM in particular is the possible existence of a response bias. This bias can be described as the "systematic tendency to respond to a range of questionnaire items on some basis other than the specific question content" (Paulhus 1991, p. 17). What is referred to as 'some other basis' in this definition can be any kind of personal, situational or procedural factor inherent to the respondent or the interview process. In a contingent valuation survey, which typically features a direct question about the individual's WTP for the environmental good, this means that these other factors together with the actual content of the question "How much are you willing to pay to get that specific good?" jointly determine the response. However, common CVM practice does not interpret the WTP response in this manner but rather takes it as exhaustive reaction to the verbatim content of the elicitation question.

A prominent form of response bias, which is often reported in the CVM as well as in the general survey literature, is socially desirable responding (SDR). It can be described as the "overall tendency of a person to respond in a socially desirable manner" (DeMaio 1984). Paulhus (1991) further defines it as "the tendency to give answers that make the respondent look good", i.e. that respondent wants to gain social status by answering what he deems desirable. This motive is referred to as *need for social approval* (Crowne and Marlowe 1964). The respondent strives for social approval by deviating from his true answer and instead stating something which is in accordance with prevalent social norms (Stricker 1963). Thus, the basis for SDR to occur is the perception of social norms by the respondent and his acting according to them. Above it was described that whenever factors other than the semantic question content jointly trigger an individual's response, response bias is at work. If these factors are social or cultural norms that are perceived by the individual and make certain self-reports or patterns of behavior appear more desirable than others, such a response bias is referred to as SDR. The behavioral motive underlying SDR is a general need for social approval by the respondent.

CVM researchers have long been acknowledging the possibility that WTP statements are confounded with SDR (e.g. Ethier et al. 2000, Laughland et al. 1994,

Leggett et al. 2003, Mitchell and Carson 1989). In contingent valuation interviews, SDR might occur for two main reasons. Firstly, no real market transactions are made, and secondly the WTP for an environmental good has to be stated in some kind of social interaction. That means, unlike in a real market transaction, the focus of this activity is not on the exchange of money for a good but rather on the statement of an intention, which is – at least for the duration of the interview – without immediate material consequence. When respondents have to state verbally what they would do under certain circumstances, the costs of deviating from a truthful response are very low. While in the private market setting such a misreporting of individual preferences would lead to an undesired material outcome for the individual, this is not the case when the WTP question is hypothetical and public goods are concerned. So it becomes clear that despite efforts to increase the consequentiality of WTP responses and thus guarantee incentive compatibility of elicitation questions (cf. Carson and Groves 2007, Poe and Vossler 2011), the hypothetical nature of the CVM still allows for both deliberate and accidental misreporting of preferences.

The second difference to the ordinary market situation – the fact that the price has to be stated in a social interaction – opens the door to the costless pursuit of other objectives by the respondent. As for private market goods, the primary motivation to pay for a good is for its purchase, although social reasons such as gaining social approval by buying certain goods might play a (minor) role, too. In the CVM interview, however, the influence of the social interaction is significantly greater. This, in turn, increases also the potential for pursuing other objectives like gaining social approval as compared to simply purchasing or not purchasing the good in the market. If this is true, the biasing influence of situational factors like SDR on WTP responses might be substantial and should be investigated. This stresses the importance of concepts of social psychology for the refinement of stated-preference approaches (Jacquement et al. 2011). Consequently, the empirical part of this study will attempt a direct assessment of the level of need for social approval of a respondent as an expression of his propensity to respond in a socially desirable manner. These two terms will be used interchangeably throughout this study.

The remainder of this paper is organized as follows. Section 2 provides an introduction to the psychological categorization of different components of SDR and their relationship to stated WTP. The third section deals with the methodology both of assessing SDR empirically and computing its influence on WTP responses statistically. Section 4 provides the empirical results and section 5 discusses them. Section 6 concludes the paper.

2. Socially desirable responding and contingent valuation

2.1. Components of socially desirable responding

SDR is not a monolithic concept, but research in this field has found distinctive components within it. When it is accepted that SDR is motivated by a general need for social approval by the respondent, different components of that construct can be separated along two lines. On the one hand, the addressee to whom the socially desirable behavior is directed matters, and on the other hand the strategy that is used to gain social approval might differ. On the level of the addressee, biased statements in front of others (*impression management*) can be separated from biased statements that even the respondent himself beliefs to be true (*self-deception*) (Paulhus 1984). What the CVM researcher should be concerned about is merely the impression management component of SDR because it constitutes a deliberate misstatement. When on the other hand, however, a respondent gives an objectively false answer but is not aware of this, i.e. believes to report truthfully, does this not pose a threat to the validity of CVM. Individual valuations, i.e. changes in utility, stem from individual preferences, which are subjective. If the self-deceptive exaggerations are part of this subjective worldview, they form the basis for that individual's preferences and are thus part of his utility. Laughland et al. (1994) hold that while self-deception, since it is believed by the respondent, also influences market decisions, impression management arises out of the interview situation and is thus without economic significance. Consequently, the present study deals with the assessment of the latter component of SDR only.

When it comes to the strategy to gain social approval one can distinguish between *enhancement* and *denial* (Paulhus 1984). Enhancement refers to the overly claiming of socially desirable characteristics or patterns of behavior which the respondent does not have in reality, whereas denial describes the overly denying of socially undesirable characteristics, which yet the respondent possesses. Put in a different way, enhancement equals the active exaggeration of a positive self-image, while denial is rather a defensive behavior to avoid being seen in too negative a light. So, these two tendencies can be regarded as subcomponents of the overall concept of SDR as triggered by need for social approval. Theoretically, these components exist in both the impression management and the self-deception conceptualization of SDR.

When it comes to the economic valuation of environmental goods, there are several reasons why responses to contingent valuation surveys are prone to be influenced by SDR. CVM is a survey-based approach and the literature on survey methodology has long been acknowledging the biasing influence of SDR in surveys (Krosnick 1999). Firstly, sociological and psychological research find surveys dealing

with reported behavior to be most likely to be influenced by SDR. In CVM, WTP statements constitute a form of reported behavior because respondents do not actually pay the stated amount but merely indicate their intention to pay. At the same time, both the elicitation question and the WTP response are hypothetical. So the fact that stating a hypothetical WTP is not associated with any real economic commitment allows the respondent to effectively influence the impression he conveys towards the interviewer (by biasing his response) at very low cost.

Secondly, most environmental problems are sensitive issues that are closely associated with social norms. Almost 20 years ago, the NOAA Panel already mentioned that preserving the environment is widely considered desirable (Arrow et al. 1993). This tendency has certainly intensified since that time. It was mentioned already that the basis for SDR is the existence of salient social norms which make a specific response option appear more socially desirable than another. Such norms certainly exist when it comes to the private contribution to the provision of an environmental good. Consequently, these increasingly strong social norms regarding environmental protection raise the probability that respondents in CVM surveys bias their answers into a socially desirable direction.

The contingent valuation study reported on below was conducted in rural Southwest China. The People's Republic of China is characterized by a political system which has not been given citizens much room for actively stating individual preferences for public projects, as well as Confucian culture which lays great stress on the notion of saving face by adhering to social norms and standards. It is believed that these factors add to the importance that individuals attach to being in conformity to what is demanded by society, i.e. social or environmental norms (Lalwani et al. 2006). Therefore, it can be expected that the individual tendency to respond in a socially desirable manner has a distorting influence on the statements of WTP in a contingent valuation survey. In the framework of this study, this influence is assessed as need for social approval, which is the motivation for SDR. It may affect WTP statements in two ways: as the influence on the likelihood to state a positive WTP rather than zero and on the specific amount of WTP. So, the following hypotheses will be tested:

Hypothesis 1a: Respondents answering in a socially desirable manner have a higher likelihood of stating a positive WTP amount rather than zero.

Hypothesis 1b: Respondents answering in a socially desirable manner state systematically higher WTP amounts.

In addition to the overall impact of SDR on WTP responses, it is conceivable that respondents score differently on the denial and enhancement components when they follow different strategies to gain social approval. Although studies with Western subjects did not show any evidence for this strategic dichotomy within the impression management dimension of SDR (Paulhus and Reid 1991), this finding has been challenged concerning Chinese respondents (Li and Li 2008). Since the background of the present study is set in rural Southwest China, it can be investigated whether denial and enhancement exert a differing influence on WTP statements. From a theoretical perspective, it can be expected that the behavioral influence of denial is stronger than that of enhancement. This claim grounds on the notion of loss aversion as specified by prospect theory (Kahneman and Tversky 1979). According to this concept, individuals value losses more strongly than equivalent gains. If losses and gains are evaluated according to a so-called value function, it was shown empirically that this function exhibits different slopes on the positive and negative branch from the reference point, respectively. With a steeper slope on the negative side, a loss is evaluated much more strongly than an equivalent gain. As a consequence, the fear of a future loss in the form of reduced wealth would have a much more motivating effect on individual behavior than the prospect of an equivalent gain because it is associated with a larger potential decrease in utility.

As specified above, enhancement describes the conscious exaggeration of one's own positive qualities in order to receive approval from others, whereas denial refers to a defensive strategy in which the respondent seeks to avoid dropping under a certain minimum level regarding his appearance in the eyes of others. It becomes clear that while enhancement indeed corresponds to the prospect of a gain in social approval, denial constitutes the fear of decreased social approval. So, if the evaluations of material or monetary gains and losses as specified by prospect theory also translate into the realm of social approval, the following hypothesis can be formulated:

Hypothesis 2: The biasing effect of the denial component of SDR on WTP statements is stronger than that of the enhancement component.

This idea is further supported by the fact that the survey was conducted in a rural area of China. When it comes to rural China, it makes sense to assume that the more defensive denial strategy is of greater importance than the enhancement strategy. It has been reported that Chinese people are educated in a way not to stand out among a group of people. Liu et al. (2003, p. 292) quote an important Confucian teaching: "Tall trees catch more wind", which stresses modesty and warns people not

to strive for individualistic goals, such as individual social approval. With this in mind, the expectation of a stronger influence of the denial component seems plausible.

2.2. Previous approaches in SDR research

Previous research of SDR in contingent valuation is mostly restricted to the detection of mode effects (e.g. Ahlheim et al. 2010, Ethier et al. 2000, Leggett et al. 2003, Whittaker et al. 1998). Such effects occur if WTP statements elicited by different survey modes, such as face-to-face, mail or telephone interviewing, differ significantly. Comparing the results of different survey modes in this manner corresponds to controlling the effect of varying levels of anonymity of the interview situation because in some of the above settings an interviewer is present and in some the respondent is alone. The piece of advice by the NOAA Panel to employ the "simulated ballot-box" for the elicitation of WTP statements (Arrow et al. 1993) has led researchers to compare different survey modes in order to isolate the impact of the degree of exposition of responses to the interviewer. An overall tendency that can be distilled from the majority of these studies is that mean WTP is higher when there is some immediate interaction between respondent and interviewer (such as face-to-face or phone interviewing) compared to indirect interaction (such as in mail and other forms of self-administered surveys). Most of the above authors attribute these findings to the effect of SDR in interview situations characterized by higher exposition of responses. However, this line of thought might not be justified for the following reason. The idea that even indirect survey modes can trigger socially desirable response behavior is expressed by the concept of sponsoring bias (Mitchell and Carson 1989). According to this concept, some respondents shape their responses in order to meet the expectations not only of the interviewer but of the institution sponsoring the survey. Following this line of argument, it thus appears possible that even respondents in mail and self-administered surveys tailor their statements towards what they deem socially desirable. Since this cannot be ruled out from a theoretical perspective, it can be concluded that the detection of mode effects does not constitute sufficient evidence for or against the existence of SDR in CVM surveys. Consequently, studies that merely detect mode effects in CVM do not say anything about the importance of SDR in this type of survey. Spinning this thought a bit further, it becomes clear that the existence of mode effects is merely a necessary condition for the detection of the influence of SDR in CVM and is not sufficient to attest this type of bias.

What is rather needed is a direct assessment of social desirability motivations (operationalized as need for social approval) in a CVM context and relating them to WTP statements. The only study to our knowledge that employed this approach was

done by Laughland et al. (1994). The hypothesis that respondents with higher need for social approval as measured by the Marlowe-Crowne social desirability scale (Crowne and Marlowe 1960) have a significantly higher WTP for socially desirable goods, such as improved food safety and landscape preservation, is not supported by the data. It should be noted that the questionnaire in this study is self-administered, so respondents do not have to state their WTP in front of an interviewer. Additionally, unlike the question inventory employed by the present study, the Marlowe-Crowne scale does not allow for a differentiated assessment of the four components of the concept of need for social approval as discussed in section 2.1. Therefore, the present study intends to fill this gap by investigating the direct effect of the relevant components of SDR on WTP statements in a face-to-face CVM survey employing an alternative question inventory.

3. Methodology

3.1. Assessing SDR

During almost six decades of SDR research, several question inventories for the assessment of individual tendencies to give socially desirable responses have been developed (e.g. Crowne and Marlowe 1960, Edwards 1957, Paulhus 1991, Schuessler et al. 1978). Yet, the only inventory that allows for a differentiated measurement of impression management and self-deception on the one hand and enhancement and denial on the other is the Balanced Inventory of Desirable Responding (BIDR) proposed by Paulhus (1984). Its impression management subscale consists of desirable but quite uncommon and undesirable but rather common characteristics or patterns of behavior, which respondents can rate with respect to themselves on a 5-point Likert scale ranging from *completely wrong* to *completely true* (cf. table 1 in the next section). Answering *completely wrong* to an undesirable item and stating *completely true* regarding a desirable item is interpreted as evidence for SDR because such a claim is highly likely to be an untruthful response. Therefore, these extreme statements are summed up for each respondent to yield an individual need for social approval score. In addition to that, subscores for enhancement and denial can be computed by counting only extreme answers to the desirable and undesirable responses, respectively. These three scores can be used as alternative indicators for the propensity of a respondent to answer in a socially desirable, weakness-denying or self-enhancing manner.

The original scale (Paulhus 1991, 1998) was shortened and modified extensively to be used with a sample in rural Southwest China. Dropping items in a first step and modifying them in a second step is recommended by Switzer et al. (1999). In this

process, six items which turned out not to be applicable with the respective survey population were dropped from the inventory. These items contained patterns of behavior which do not apply to the majority of respondents. Subsequently, several of the 14 remaining items were modified to ensure a proper comprehension by respondents. The subsequent linguistic modification was done based on in-depth interviews with citizens regarding the existence of social norms governing the behavior described in the items. Following Stricker (1963) it is assumed that it is salient social norms that make certain patterns of behavior or intentions desirable or undesirable. Only if such a norm exists in a certain cultural environment and a respondent with high need for social approval perceives it, does he feel an incentive to select the socially desirable, thus extreme, response option. The fulfillment of this condition by the modified items is ensured by the conduction of in-depth interviews for respondents from the survey population. The final inventory is displayed in table 1 in the next section, where its empirical performance and validity and reliability are discussed.

3.2. The estimation model

The objective of this study is to scrutinize whether SDR is a systematic determinant of WTP statements. In order to find the determinants of WTP statements, a two-step model, in which the respondent comes to a decision on his WTP for the respective environmental good, is applied. It is assumed that the respondent first decides whether or not he wants to pay at all. In case he is generally willing to pay, in a second step he comes up with a specific money amount. The study employs the payment card (PC) approach and the midpoint of the selected interval is used as dependent variable in this model. The appropriate estimation model to detect determinants of both processes is a two-step selection model as developed by Heckman (1979). By applying this approach it is possible to identify determinants of the decision for a positive WTP and for the specific WTP amount at the same time. The model is represented by:

$$y_i = \boldsymbol{\beta}' \boldsymbol{x_i} + e_i \tag{1}$$

$$z_i^* = \boldsymbol{\alpha}' \boldsymbol{w_i} + u_i \tag{2}$$

with

$$z_i^* = \begin{cases} 1 \;\; if \;\; z_i > 0 \\ 0 \;\; if \;\; z_i = 0 \end{cases} \tag{3}$$

where

$$e_i \sim N(0, \sigma)$$
$$u_i \sim N(0, \sigma) \quad (4)$$
$$Corr(e, u_i) = \rho.$$

$\boldsymbol{x_i}$ is the vector of explanatory variables in the outcome equation (1) with y_i, the stated WTP amount of household *i*, as dependent variable. $\boldsymbol{w_i}$ denotes the vector of explanatory variables in the selection equation (2) with the decision whether the respondent is generally willing to pay for the proposed project ($y_i > 0$) or not ($y_i = 0$) as dependent variable. The realization of z_i^* is given in (3). It is equal to 1 if a respondent's WTP is positive and zero if also the WTP is zero. The expected WTP given that it is positive can then be expressed as

$$E[y_i | z_i^* > 0] = \boldsymbol{\beta}' \boldsymbol{x_i} + \rho \sigma_e \lambda_i (-\alpha' w_i / \sigma_u) \quad (5)$$

with $\lambda_i(-\alpha' w_i/\sigma_u) = \phi(\boldsymbol{\alpha}' \mathbf{w_i}/\sigma_u)/\Phi(\boldsymbol{\alpha}' \mathbf{w_i}/\sigma_u)$ denoting the inverse Mill's ratio. In this equation the correlation coefficient between the error terms of equations (1) and (2), e_i and u_i, is given by ρ. Estimating this equation yields the coefficients of the outcome equation corrected for the fact that some respondents do not state a positive WTP (sample selection) as well as the coefficients of the selection equation. The latter set of coefficients are the result of a probit model with the dependent variable z_i^*. If ρ significantly differs from zero, the two-step procedure must be used to estimate $\boldsymbol{\beta}'$, otherwise these estimates are biased as a result of sample selection. If ρ turns out to be zero, the two processes are independent, but the two-step procedure is still valid (Breen 1996).

In order to investigate the influence of SDR on WTP statements, four different models are computed. Firstly, the overall BIDR score is included both into the selection and outcome equation. It is expected that the coefficients of the BIDR score in both equations are positive, i.e. that SDR constitutes incentive to state a positive WTP rather than zero and to state a higher WTP amount. Secondly, the separate enhancement and denial scores are included into the estimation model in turn. If the impact of denial is stronger, its coefficient should turn out to be significant, whereas in the enhancement model this coefficient should not be significantly different from zero. Finally, a model including both the denial and enhancement components simultaneously is computed. It is hypothesized that the impact of the denial component is much stronger than that of the enhancement part as a result of the stronger motivational implications of loss aversion. The next section provides some

background information on the survey study in China and then presents the results of the modified question inventory as well as of this estimation model.

4. Empirical results

As a part of a larger Sino-German research cooperation, the survey was conducted from June to August 2009 in Jinghong, the capital of Xishuangbanna Prefecture in rural Southwest China. In recent decades, traditional landuse patterns in this tropical part of China have been disrupted by the rapid spreading of large scale rubber plantations (*hevea brasiliensis*). On slopy hillsides below an altitude of 1000m above sea level, a good part of former tropical rainforest has been cut down and rubber trees have been planted on the respective plots. This expansion of rubber cultivation has led to an unprecedented economic development associated with rising incomes of the rubber farmers in rural areas and also the general population. At the same time, this development causes a tremendous loss in biodiversity resulting from forest cutting, loss of water resources due to increased precipitation run-off, soil erosion as well as adverse effects on the microclimate (Ziegler et al. 2009). So it appears that the obvious economic gains of rubber cultivation are bought at a very high environmental price. In order to quantify the environmental and social costs of rubber cultivation in this area, the present study employs the CVM to assess the social value of a reforestation program featuring a conversion of existing rubber plantations back into forest. WTP statements for a fund set up to finance these reforestation efforts are elicited in the survey of urban residents. The city-dwellers were chosen as survey population because – unlike the rural population – they do not directly profit from rubber cultivation but also have to bear the negative environmental consequences. Therefore, a potentially negative WTP for a roll back of rubber cultivation due to income losses can be ruled out among this part of the population.[2]

The survey yielded 1,979 completed interviews out of which 1,668 contained a completed BIDR inventory. While in the whole sample the response rate to the WTP question is 98.33% (1,946 valid responses), it is 98.50% (1,643 valid responses) for those respondents who answered all BIDR items. Since a comparable SDR score can only be calculated for those respondents who have completed all items of the BIDR, the further analysis will be confined to this part of the sample (N=1,668).

[2] As in-depth interviews in the run-up to the survey revealed, the detrimental environmental effects of large-scale rubber cultivation are so salient and controversial in this region that the question of their mitigation constitutes a sensitive issue. Consequently, grave concerns regarding the occurrence of SDR in the survey interviews existed before the study was conducted.

As a first step, the results of the modified BIDR are presented. Table 2 provides response frequencies for all items. It can be seen from the table that most responses for the denial items (2, 5, 6, 7, 8, 10 and 12) are on the two response options to the left and the majority of responses regarding the enhancement items (1, 3, 4, 9, 11, 13 and 14) concentrate on the other side. That is, the major part of respondents reject the denial items and support the enhancement statements. This reflects the fact that there are well-known social norms which render the content of the enhancement items desirable and that of the denial items undesirable. In addition to that, Cronbach's alpha, a measure of internal-consistency reliability of a question inventory, is 0.695 for this scale. Values around 0.7 are reported to indicate a sufficient level of internal-consistency (Switzer et al. 1999).

	N = 1,668	Completely wrong	Predomi-nantly wrong	Party wrong, partly true	Predomi-nantly true	Completely true
		(in percent)				
1	I am a person that doesn't cover up mistakes.	2.5	14.2	14.3	36.8	32.3
2	There have been occasions when I have taken advantage of someone.	31.1	21.3	19.5	23.4	4.7
3	I am a person that doesn't swear.	10.1	8.4	8.3	21.9	51.1
4	I obey laws, even if I'm unlikely to get caught.	1.0	2.5	4.3	16.9	75.4
5	I may have said something bad about a friend behind his or her back.	29.6	19.4	22.9	22.2	5.8
6	When I hear people talking privately, I cannot help listening.	39.0	20.8	15.0	16.7	8.6
7	It may happen that I receive too much change from a salesperson without telling him or her.	65.2	16.0	8.9	6.8	3.1
8	When I was young, I tended to steal things.	53.8	11.5	11.3	15.7	7.7
9	I am a person that never drops litter on the street.	3.4	7.4	12.8	22.0	54.5
10	I take pleasure in reading sexy books or magazines.	71.9	15.1	7.4	3.5	2.2
11	I would never take things that don't belong to me.	2.6	2.6	4.4	15.8	74.5
12	I have taken sick-leave from work or school even though I wasn't really sick.	48.7	11.0	11.9	16.9	11.5
13	If I damage merchandise in the supermarket I definitely report it to the staff.	2.3	3.4	5.9	17.8	70.6
14	I am a person that doesn't gossip about other people's business.	1.3	2.6	7.4	21.6	67.1

Table 1: The modified version of the BIDR to measure need for approval.

A histogram of the individual need for approval scores that can be calculated from the above set of items is displayed in figure 1. While respondents can theoretically reach any score from zero to 14, there is no respondent scoring 13 or 14. The most frequent score out of all 1,668 respondents who completed the inventory is 8. The overall mean score is 6.75, whereas the median is 7. In order to test construct validity of the inventory, it can be tested if determinants of the resulting need for social

approval score are in conformity with earlier empirical findings. A significant difference in need for social approval scores of male (μ=6.31) and female (μ=7.12) respondents can be detected (p=0.000). This finding has been frequently reported in the literature (Becker and Cherny 1994, Paulhus 1991). Similarly, respondent age and need for social approval are correlated in a significantly positive way (r=0.342, p=0.000). The result that older respondents score higher on the BIDR can also be found in the literature (Winkler et al. 2006).

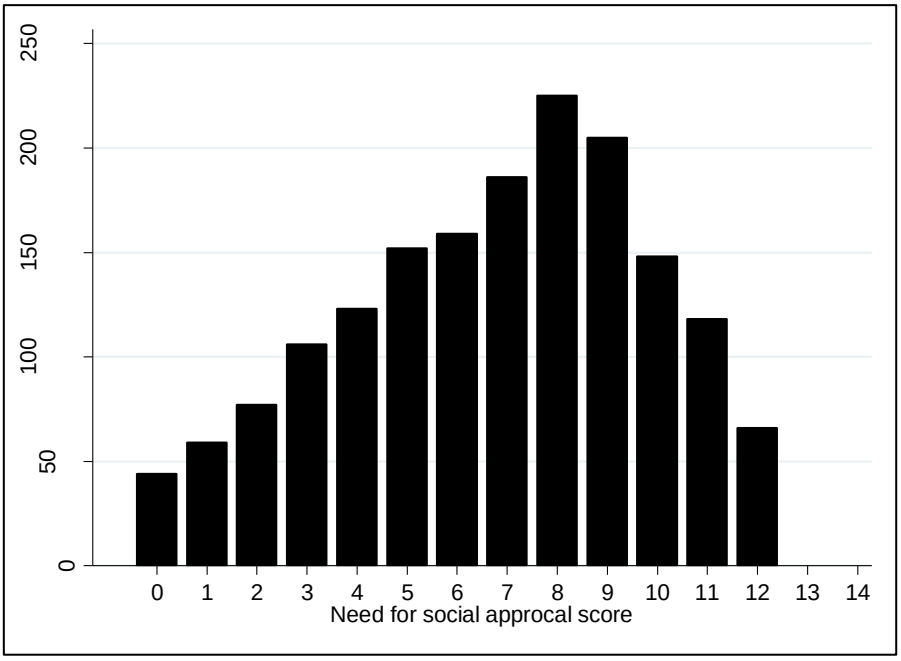

Figure 1: Distribution of need for social approval scores (N=1,668)

As another test of construct validity of the scale, a principal-component factor analysis is conducted and displayed in table 3. The analysis is limited to two factors. What can be seen from the table is that most of the items clearly load on the expected factor, even though the loadings between 0.4 and 0.7 are relatively low. Merely item 10, which is a denial item, has a loading on this factor even below 0.4. It appears that this item somewhat steps out of line. However, overall this factor analysis is able to distinguish between the two theoretically different components of need for social approval and thus adds to the evidence of construct validity of the modified scale. In the light of these findings the modified version of the impression management subscale of the BIDR appears to reliably and validly assess the individual need for social approval and thus the incentive to engage in SDR. Therefore, the resulting score as well as the enhancement and denial scores can be employed for the subsequent statistical analysis.

	N = 1,668	Enhancement	Denial
1	I am a person that doesn't cover up mistakes.	0.557	
2	There have been occasions when I have taken advantage of someone.		0.677
3	I am a person that doesn't swear.	0.485	
4	I obey laws, even if I'm unlikely to get caught.	0.594	
5	I may have said something bad about a friend behind his or her back.		0.693
6	When I hear people talking privately, I cannot help listening.		0.475
7	It may happen that I receive too much change from a salesperson without telling him or her.		0.499
8	When I was young, I tended to steal things.		0.539
9	I am a person that never drops litter on the street.	0.552	
10	I take pleasure in reading sexy books or magazines.		0.345
11	I would never take things that don't belong to me.	0.548	
12	I have taken sick-leave from work or school even though I wasn't really sick.		0.539
13	If I damage merchandise in the supermarket I definitely report it to the staff.	0.567	
14	I am a person that doesn't gossip about other people's business.	0.632	

Table 2: Factor analysis of the 14 items of the modified BIDR scale with promax rotation. Factor loadings smaller than 0.2 are omitted.

In order to analyze the impact of the social approval score on WTP statements, a two-step regression model is fitted according to (1)-(4). The output is displayed in table 4, with the first-step model of the selection equation in the lower part and the second-step model of the outcome equation in the upper part of the table. The dependent variable of the selection equation is *positive WTP*, which is 1 for any positive WTP statement and zero if also the WTP is zero. Regarding the outcome equation, the dependent variable (*WTP*) is the midpoint of the payment card interval selected by the respective respondent. The control variables are treatment dummies for different split samples, which are of no interest for this study. Further, the models include all those socio-demographic variables that were found to be significant determinants of WTP statements. The table shows that regarding the first step, the selection equation, the fact that the respondent is male and the size of the respective household (HHSIZE) have a negative impact on the likelihood to state a positive WTP. In addition to that, the fact that a household itself owns rubber trees (RUBBER) and the levels of education and of household income significantly increase this likelihood in most models. The positive impact of owning rubber trees, which is surprising at first glance, might be explained by the geographical location of the reforestation project to be valued. Out of the 232 respondents in the relevant sample owning rubber plantations only six, i.e. 2.5%, have their trees in the nature reserve area. Taking into account that the majority of rubber owners in the sample will not be affected by the public project in question, the positive effect of RUBBER appears less troubling. In the second step, the outcome equation, respondent age and the fact that

he is married negatively affect the amount of stated WTP. Variables significantly driving up the amount of stated WTP include level of education, household income and subjective life satisfaction (SATIS).

	Model 1		Model 2		Model 3		Model 4	
Variable	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**
Outcome equation: Dependent variable: positive WTP (1 = Yes, 0 = No)								
CONSTANT	8.12	0.647	10.77	0.544	6.95	0.693	7.58	0.668
Control variables	X		X		X		X	
MALE	6.76	0.152	5.19	0.264	7.84*	0.098	7.77	0.101
AGE	-0.47**	0.038	-0.36	0.102	-0.50**	0.025	-0.48**	0.035
MARRIED	-13.59***	0.008	-13.12**	0.011	-13.36***	0.009	-13.08**	0.011
EDUCATION	6.38***	0.002	6.33***	0.002	6.50***	0.001	6.53***	0.001
INCOME	$2 \cdot 10^{-5}$***	0.001	$2 \cdot 10^{-5}$***	0.001	$2 \cdot 10^{-5}$***	0.001	$2 \cdot 10^{-5}$***	0.001
SATIS	8.33**	0.016	8.64**	0.012	8.44**	0.014	8.60**	0.013
APPROVAL	1.57*	0.054						
ENHANCE			0.79	0.559			-1.05	0.489
DENIAL					3.88***	0.006	4.37***	0.006
Selection equation: Dependent variable: WTP								
CONSTANT	0.78***	0.001	0.71***	0.001	0.88***	0.000	0.78***	0.001
Control variables	X		X		X		X	
MALE	-0.20**	0.012	-0.20**	0.013	-0.21***	0.008	-0.22***	0.007
HHSIZE	-0.06**	0.030	-0.06**	0.025	-0.06**	0.037	-0.06**	0.028
RUBBER	0.24**	0.042	0.24**	0.038	0.23**	0.048	0.24**	0.043
EDUCATION	0.08**	0.024	0.08**	0.020	0.07**	0.035	0.07**	0.029
INCOME	0.00*	0.092	0.00	0.107	0.00*	0.089	0.00	0.119
APPROVAL	0.01	0.582						
ENHANCE			0.03	0.136			0.05**	0.037
DENIAL					-0.01	0.571	-0.04	0.117
rho	-0.04	0.802	-0.04	0.794	-0.04	0.812	-0.04	0.807
Wald χ^2	80.10***	0.000	76.65***	0.000	84.34***	0.000	85.23***	0.000
No. Obs.	1483		1483		1483		1483	

***, **, * mean statistical significance at 1 %, 5 % and 10 %, respectively

Table 3: Results of the Heckman two-step regression models of WTP statements. Control variables include treatment dummies for different split samples.

When it comes to the impact of need for social approval on WTP statements, we have to look at the four different models displayed in table 4 one by one. In model 1 on the left-hand side, merely the overall need for social approval score computed

from the modified BIDR (APPROVAL) is included as additional explanatory variable. While it does not have a significant effect on the decision to state a positive WTP, it significantly influences the actual WTP amount. That means that given a positive WTP, respondents with a high need for social approval state a higher amount than those with a low need for approval. This finding confirms expectations about the relationship between SDR (in the form of need for social approval) and stated WTP in part.

In models 2 and 3 the need for approval score is exchanged with the separate enhancement and denial scores, respectively. The inclusion of only the enhancement component in model 2 does not yield any significant results, whereas this is different regarding denial. In model 3, the coefficient of the denial component is positive and highly significant in the outcome equation. These findings support the expectation that denial exerts a stronger behavioral influence than enhancement. Within the concept of need for social approval, denial appears to be the driving force, as suggested by prospect theory.

Finally, model 4 simultaneously contains both the enhancement and the denial score. Regarding the outcome equation, the findings of models 2 and 3 are confirmed. While the positive impact of denial on the amount of stated WTP is highly significant, the coefficient of the enhancement component is not significant. Comparing this result with model 1, it seems that the positive impact of the overall need for social approval score (APPROVAL) is largely determined by the strong influence of its denial component.

When it comes to the selection equation, however, the resulting coefficients of these components come somewhat as a surprise. Enhancement affects the decision to state a positive WTP in a significantly positive way, but denial does not influence this decision. This contradicts expectations as laid down in hypothesis 2 in two ways. Firstly, it was presumed that rather denial and not enhancement exerts the stronger behavioral force. Secondly, it was expected that, if there is any effect on the decision between zero and positive WTP, it would be from the denial component and not from enhancement. Yet, the results of the first step of model 4 indicate that only enhancement drives the number of zero responses down, whereas denial has no significant effect.

5. Discussion

Since the BIDR, an established question inventory for the assessment of socially desirable responding, is not directly applicable to the survey population of the present study, extensive modifications had to be made. Consequently, it is of great importance for the validity of the results that the modified inventory assesses SDR reliably and validly. The good performance of the modified inventory is documented in both parts of the analysis above. Firstly, direct indices of the reliability and validity are reported. Secondly, the fact that both the effect of the overall need for approval score and the distinction of denial and enhancement turn out as predicted by theoretical considerations, further attest the measurement accuracy of the modified inventory. During the pretest stage of the survey, concerns were raised that respondents who exhibit some form of extreme response style (cf. Greenleaf 1992) might end up with an artificially high need for approval score. Yet, the significantly positive relationship between that score and the amount of stated WTP refutes these concerns because there is no reason why an artificially extreme pattern of responses to the 5-point Likert scale of the BIDR should coincidence with the selection of a high amount on the PC. What matters is obviously item content and not (extreme) response style.

In addition to that, this study showed empirically that a respondent's propensity to strive for social approval systematically drives up WTP statements, i.e. hypothesis 1a cannot be rejected. Unlike previous studies that intended to show the effect of SDR in contingent valuation surveys by means of detecting mode effects, this study establishes a direct link between the respondent's personal disposition to appreciate social approval and a positive bias of WTP responses. Therefore, this result constitutes empirical evidence for the presumption of the influencing nature of SDR in CVM, which has been permeating the literature for many years. When it comes to the decision to state a positive WTP or zero, however, this biasing effect cannot be found. There is no significant difference in the likelihood that a respondent scoring high on SDR selects a positive WTP as compared to a respondent scoring low on this scale. As a consequence, hypothesis 1b has to be rejected.

These results – at least partly – contrast the findings of Laughland et al. (1994). Those authors did not detect any direct relationship between need for social approval as assessed by the Marlowe-Crowne Scale and WTP statements at all. A reason for this seemingly contradictive result might be the fact that the Laughland et al. survey was self-administered whereas the present study employed direct interviews. A general need for social approval might influence WTP statements only (or mostly) in those settings where an interviewer is directly involved. Therefore, future research in this field should compare the effect of SDR on WTP responses in different survey

modes. Only by integrating a direct assessment of the psychological propensity to strive for social approval into an analysis of mode effects can the assumption that higher interviewer exposure leads to stronger SDR bias be tested. In a review of earlier SDR literature, Krosnick (1999, p. 47) finds that “socially desirable responses were apparently more common under conditions of high identifiability”. This relationship has frequently been discussed in the CVM literature and constitutes the main justification to put mode effects on a level with evidence for SDR (e.g. Leggett et al. 2003). Yet convincing empirical evidence for this claim is still lacking in that field. So, in order to substantiate this claim, future research should assess individual SDR scores across survey modes and study the interactive impact of survey mode and SDR score on WTP responses. This approach appears promising for better understanding the difference between the distinct effects of anonymity, sponsoring bias and SDR.

Beyond the evidence of the overall impact of SDR, the analysis of the effects of the components enhancement and denial yields mixed results. Regarding the influence on the amount of WTP statements, models 2 to 4 show a stronger influence of denial, which partly supports hypothesis 2. This result is consistent with the idea that loss aversion as put forward by prospect theory does not only cover material gains and losses but also extends into the sphere of social status. The data show that – at least for the second step of the respondent’s decision model – the driving force behind SDR is the fear of social disapproval rather than the pursuit of higher social status through exaggerated self-representation.

Regarding the decision whether or not to pay at all for the proposed environmental good, the situation is less clear. Although there is no effect of enhancement when included alone in model 3, it exerts a positive effect in model 4. The finding that enhancement positively affects the likelihood to state a positive WTP accompanied by the insignificant coefficient of denial in model 4 is a rather surprising outcome. Since the denial concept expresses an individual’s effort to avoid social disapproval, this factor was expected to work more strongly for lower (and especially for zero) WTP statements. Respondents who feel that their WTP might be below what they consider the ‘socially appropriate’ level of WTP might feel an incentive to bias the WTP upwards in order to avoid social disapproval resulting from not meeting this social standard. Although the researcher is ignorant of the respondent’s subjective perception of what this standard is, what can be said is that the likelihood of this bias should be higher in the lower WTP ranges and decrease with the WTP amount. Yet, this line of thought is not supported by the present data, which would call for a rejection of hypothesis 2.

Taking together the results of the two steps of the regression models, no clear tendency as to which component mainly drives SDR can be discerned. Although the denial component seems to be a bit stronger, the entirety of results in regression models 2 to 4 do not support hypothesis 2. What can be said, however, is that this analysis replicates the empirical finding by Li and Li (2008) that – unlike for Western subjects – for Chinese subjects denial and enhancement exert different behavioral impacts even within the impression management component of SDR. Obviously, different components within the SDR concept affect different steps in the decision process of the respondent to come to a WTP amount.

However, one more word of caution regarding the two-step regression model applied here seems appropriate at this point. The distinction between the decision to state zero or a positive WTP and the decision on the specific amount in this study is a mere analytical one because for the respondent there is only one elicitation question and one response on the PC. So, in order to test the influence of denial and enhancement on the decision between paying and not paying more explicitly, the above study should be done in connection with the dichotomous choice elicitation format. It seems plausible that accepting a predefined bid provides respondents with a high need for social approval rather with a chance to satisfice some form of duty to prevent social disapproval than to exaggerate the presentation of oneself. Therefore, it needs to be studied whether in this take-it-or-leave-it approach the enhancement component exerts any significant influence at all.

6. Conclusions

This paper explores the direct effect of socially desirable responding in the form of need for social approval on WTP stated in face-to-face contingent valuation interviews. To this end, concepts from social psychology are integrated into the CVM framework. By this means, the analysis can go beyond the detection of mere treatment effects but is rather able to determine psychological factors originating in the interview process that directly distort WTP responses. To this end, the two following objectives were pursued: Firstly, a question inventory for the assessment of individual need for social approval as basic incentive for SDR had to be found and secondly, the direct influence of socially desirable responding and its sub-components on WTP was to be investigated. The data from a contingent valuation survey regarding the benefits of reforestation in Southwest China support the prominent presumption in the literature that SDR is a biasing factor in in-person CVM surveys in a direct way. By employing a question inventory originating in social

psychology, the individual propensity to give socially desirable responses could be directly related to WTP statements.

The idea that the notion of loss aversion also applies to social approval is not clearly reflected in the data. The results provide hints that the biasing effect of SDR on the amount of stated WTP might in fact be caused by the defensive denial component rather than by the respondent's tendency to exaggerate his own positive characteristics. Yet, the latter component seems to be the driving force when it comes to the decision to state a positive WTP or zero. Taking into account this impact of enhancement on the selection question in model 4, it appears still too early to dismiss completely the role that enhancement might play as biasing factor of WTP statements. Nevertheless, it would be helpful to come to a better understanding the source of SDR in contingent valuation surveys. Such insights could provide recommendations regarding question formulation and interviewer performance in order to avoid this response bias a priori. If denial, the fear of losing social approval caused stating an undesirable WTP amount, is indeed the driving factor of this bias, question wording and interview conduction should further stress that there is no wrong response, neither from a social nor from a situational point of view.

The findings of this study emphasize the need for a further investigation of the effect of SDR on WTP statements. Such an investigation must not be confined to the detection of mode effects but must directly assess all relevant components of SDR and relate them to WTP responses. To this end, concepts and tools of social psychology, such as SDR and the BIDR turned out to be very helpful. Even if no concluding answer to the exact form of the influence of SDR can be provided, this study is a step to better understanding the social context of the respondent's valuation task. As pointed out by Jacquement et al. (2011), environmental choices are made in a social context and not (merely) in market exchange institutions. One such alternative institution is the CVM interview, the social psychology and social interactions of which still need to be better understood.

Consequently, future research could also investigate the linkages between SDR as assessed in this study and other frequently discussed distortions, such as interviewer effects, yea-saying, reciprocity motivations and protesting. It is conceivable that SDR does not only have a direct impact on WTP responses but also lies at the root of those other biases. If this is true, SDR might have an additional and indirect effect on WTP statements. For instance, it is conceivable that respondents with a high need for social approval are more prone to be subject to interviewer effects than respondents without such need. Therefore it is advisable to apply a psychological inventory for the assessment of need for social approval within the framework of methodological studies investigating the above issues.

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