The effects of extrinsic incentives on respondent behaviour in contingent valuation studies

Michael Ahlheim [a] , Tobias Börger [a b] & Oliver Frör [c]

[a] Institute of Economics, University of Hohenheim, Stuttgart, Germany

[b] Plymouth Marine Laboratory, Prospect Place, The Hoe, Plymouth, UK

[c] Environmental Economics, Institute of Environmental Sciences, University of Koblenz-Landau, Landau, Germany
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Michael Ahlheim[a], Tobias Börger[a,b]* and Oliver Frör[c]

[a]Institute of Economics, University of Hohenheim, Stuttgart, Germany; [b]Plymouth Marine Laboratory, Prospect Place, The Hoe, Plymouth, UK; [c]Environmental Economics, Institute of Environmental Sciences, University of Koblenz-Landau, Landau, Germany

In contingent valuation studies to assess the economic value of environmental goods, respondents are often given small presents or money amounts at the beginning of the interview to compensate them for their time spent on the survey and to encourage them to be conscientious when answering the questions. Yet, it is still an open question whether this practice biases contingent valuation survey responses, especially stated willingness to pay (WTP) for the respective environmental good. This study employs a set of field experiments to investigate the effect of respondent incentives in the form of monetary and in-kind gifts on responses in a contingent valuation survey. It is analysed how these different kinds of incentives affect (1) respondents' diligence when answering contingent valuation method questions, (2) the likelihood of a respondent to state a positive WTP and (3) the amount of stated WTP. Results show that with respect to raising respondents' diligence in the survey interview, a moderate monetary incentive is most effective. The results regarding the effect on WTP statements are less clear. While the likelihood to state a positive WTP is increased by most incentives, mean WTP estimates are virtually unaffected.

Keywords: public expenditures; environmental valuation; contingent valuation method; respondent incentives; reciprocity; reforestation

1. Introduction

One of the most prominent methods for the appraisal of environmental changes and public projects in the environmental sector is the contingent valuation method (CVM). Since it belongs to the class of stated-preference methods, the validity of CVM survey results is under permanent discussion (Venkatachalam 2004, Carson and Hanemann 2005). In this paper, we deal with a specific source of potential biases occurring in practical CVM studies: the effects of material incentives on respondent compliance and on stated willingness to pay (WTP).

The CVM relies on interviews where a representative sample of all households affected by a certain public project is asked – among other things – their WTP for the realisation of that project. These individual statements are then extrapolated to assess the social WTP for the project which is interpreted as the monetary value of

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*Corresponding author. Email: tobo@pml.ac.uk

the social benefits it creates. The social benefits can then be compared to the project costs in order to decide if its realisation is remunerative for society or not.

For the reliability of CVM survey results, it is necessary to keep the rejection rate as low as possible and to ensure that respondents consider the questions they are asked carefully and answer them truthfully. Both requirements – low non-response rates and truthful responding – are crucial preconditions for valid and reliable estimates of the social value of environmental projects. However, these preconditions might often not be fulfilled in practical surveys when especially those respondents who have a critical view towards the public project or the valuation approach fail to answer essential questions. Especially in developing countries it has, therefore, become customary to offer interviewees small gifts or small amounts of money to provide incentives for them to comply with these requirements. Therefore, the intentions behind such incentives are that we want people to comply with the interview request (i.e. minimise the rejection rate), to be diligent in their responses, i.e. to go to great intellectual efforts to answer all questions even if they have to think hard to answer them (in order to minimise the item non-response rate), and answer the WTP question truthfully (i.e. minimise the elicitation bias). Our gifts are intended to trigger a process of social bonding between respondents and our interviewers: receiving a gift from our interviewers makes respondents want to reciprocate this favour – hopefully in terms of increased efforts to answer our questionnaire as carefully and truthfully as possible. We want to implement a social relation of reciprocity between interviewers and respondents as defined by Kolm (2006a, p. 25): 'A gift or favour motivated by another gift, for instance the return gift of an initial gift, constitutes the very important social relation of reciprocity'. Unfortunately, we cannot tell in advance how exactly respondents will reciprocate our gift. Ideally, all three of the above stated intended effects will be attained. People's natural desire to reciprocate favours they have received from others might lead them to agree to a CVM interview though they do not feel like it, it might make them think harder about our questions – but at the same time it might also induce them to state a higher than their true WTP for the suggested project in order to show their gratitude. This latter form of gratitude would lead to biased overall WTP and is, of course, not desired.

Actually, things are even more complicated. Already the basic question if a gift is helpful at all in triggering the motivation of respondents to answer CVM questions carefully is controversial. In a well-known series of articles, Frey (1994), Frey *et al.* (1996) and Frey and Oberholzer-Gee (1997) showed theoretically and based on laboratory experiments that the intrinsic motivation for a certain task can be crowded out by providing extrinsic incentives. Also, examples are given in Gneezy and Rustichini (2000) and Gneezy *et al.* (2011), where the introduction of extrinsic incentives deteriorates the performance of certain tasks, especially if these tasks had been considered commendable or pro-social or simply a matter of civic duty before. Referring to a game-theoretic study by Liberman *et al.* (2004) they conclude: 'Moving from no incentive to a positive incentive can dramatically change the framing of the interaction and shift an individual's decision frame from social to monetary' (Gneezy *et al.* 2011, p. 200). Also, Ariely (2008) reports effects like this from his laboratory experiments (Ariely 2008, p. 75 ff.). Applying this insight to the CVM interview situation offering an extrinsic incentive might change people's whole view of the interview: without incentive they might consider it their civic duty to support science by agreeing to the interview and help government make good

decisions, i.e. they comply with a generally acknowledged social norm. After they have been offered an extrinsic incentive (money or in-kind), the whole framing of the interview situation changes: the relation of social exchange with the interviewers guided by a social norm in which they had seen themselves before is now crowded out by a relation of market exchange where they consider their participation in the interview as a kind of deal to which they agree only if the compensation balances their effort. Such effects are also observed, for example, by Ariely (2008, p. 84 ff.). Besides these framing effects, other psychological reasons might also be responsible for adverse consequences of gifting respondents. Interpreting the CVM interview as a kind of a principal-agent game where the interviewer is the principal who cannot be sure about the true mental efforts made by the respondent-agent in answering his questions, an extrinsic incentive might lead to the impression on the side of the agent that the principal does not trust his reliability and scrutiny without extra incentives. This might backfire in that the respondent feels offended by this suspected expression of distrust and lowers his efforts as a consequence (cf. Gneezy *et al.* 2011, p. 192). So the first research question we will try to answer in this study is the question in how far extrinsic incentives trigger respondents' efforts in answering CVM questions.

If we are determined to fuel respondents' motivation through extrinsic incentives, the question arises which kind of incentive is most suitable in the light of our three intentions stated above. Should we give money or a small in-kind gift? As Gneezy *et al.* (2011, p. 192) state: 'Monetary incentives have two kinds of effects: the standard direct price effect, which makes the incentivized behavior more attractive, and an indirect psychological effect'. While the psychological effect might or might not counteract our intentions to increase respondents' scrutiny, the price effect always works into the right direction. This seems to speak in favour of money incentives. On the other hand, Heyman and Ariely (2004) found in laboratory experiments where candidates had to perform seemingly dull tasks that candy worked better as an incentive than money. Ariely (2008, p. 82 ff.) holds that by offering money as an incentive, a market exchange situation is created where people compare the payment they get with the effort they have to undergo and where they adjust their effort to the amount of the payment, while with small in-kind gifts, a social exchange situation might be created where people do their very best to reciprocate the kindness they received. Gneezy *et al.* (2011, p. 201) also point out that your chances to get into bed with an attractive woman is typically not enhanced if you offer her money, an in-kind gift like a bunch of flowers might work much better in this context. We will scrutinise this second research question in our study, i.e. the question of what has a more favourable effect on respondents' diligence in answering CVM questionnaires, money or in-kind gifts.

If, in spite of the unfavourable predictions made by Ariely *et al.*, we decide in favour of money incentives because this is customary in CVM surveys, it is important to find the right amount. Gneezy *et al.* (2011, p. 191) state that 'the basic "law of behavior" is that higher incentives will lead to more effort and higher performance.' But this 'law of behavior' does not represent a universal truth as the authors state shortly after. Also, Gneezy and Rustichini (2000) report from experimental studies where they found that (i) both large and small monetary incentives reduced candidates' efforts as compared to a control group where no material incentives were provided and (ii) small monetary incentives reduced efforts more than larger payments. These – at first glance counterintuitive – findings

motivated the title of their article: 'Pay enough or don't pay at all'. The reason for these results might again lie in the antagonism of the price effect and the psychological effects of monetary incentives. For low payments, the adverse psychological effects dominate the price effect, while this imbalance is reversed as payments become larger. Furthermore, if money gifts really create a market exchange situation as e.g. Ariely (2008) holds, low payments should obviously call for lower effort than high payments. These findings lead to the research question if large money incentives on the one hand and small money incentives on the other have different effects on respondents' diligence in answering CVM questionnaires. Analogously, regarding in-kind incentives, the question arises if expensive in-kind incentives on the one hand and less expensive in-kind incentives on the other have different effects on respondents' diligence in answering CVM questionnaires.

As explained above, the last thing we want is that respondents show their gratitude for the gift they received by stating a higher than their true WTP because this would render our results invalid. Therefore, we have to check if material incentives (monetary or in-kind) affect respondents' stated WTP for the public project under discussion.

In a practical CVM study conducted in Xishuangbanna in southwest China, we scrutinise these research questions in detail using field experiments. Applying altogether five different treatments (high and low money payments, high- and low-priced in-kind gifts and no gift at all as a control treatment), we analyse the effects of different forms of gifts on respondents' compliance on the one hand and on stated WTP for an environmental improvement (biodiversity preservation in Xishuangbanna) on the other. We find that all incentives under investigation increase respondents' willingness to answer also intellectually demanding questions with the low monetary incentive performing best. None of the incentives leads to a significant *increase* in average stated WTP as compared to the reference sample. However, the low-value gift, though having the same monetary value as the low money payment, leads to a significant *decrease* of average stated WTP, which might mean that for some reason respondents felt offended by this gift. Furthermore, a two-step Heckman regression model shows that monetary and in-kind gifts might both influence respondents' inclination to state a positive WTP instead of zero. Considering the advantages and disadvantages of all kinds of incentives analysed, our recommendation for future CVM studies is to offer respondents low money payments before the interview in order to trigger their compliance without influencing their WTP statements.

In the next section, we will review the existing literature on reciprocity and incentives in surveys. In section 3, we describe our empirical study in Xishuangbanna, and in section 4, we discuss our results. Section 5 contains some concluding remarks.

2.   Respondent incentives and reciprocity in surveys

In this study, we scrutinise the reaction of CVM survey participants to extrinsic incentives both theoretically and empirically. As explained in detail in the previous section, we will try to answer the following five research questions:

Research question 1: Do extrinsic incentives trigger respondents' efforts in answering CVM questions?

Research question 2: What has a more favourable effect on respondents' diligence in answering CVM questionnaires, money or in-kind gifts?

Research question 3: Do large money incentives on the one hand and small money incentives on the other have different effects on respondents' diligence in answering CVM questionnaires?

Research question 4: Do expensive in-kind incentives on the one hand and less expensive in-kind incentives on the other have different effects on respondents' diligence in answering CVM questionnaires?

Research question 5: Do material incentives (monetary or in-kind) affect respondents' stated WTP for the public project under discussion?

After introducing some theoretical approaches to explain reciprocal behaviour originating in survey methodology and game theory, an overview of empirical findings on the effect of incentives in surveys is provided.

2.1. Theoretical approaches to explain reciprocal behaviour in surveys

The methodological literature on respondent incentives in face-to-face, mail and telephone surveys basically distinguishes conditional from unconditional incentives on the one hand and categorises cash payments and in-kind gifts on the other. An unconditional incentive is an upfront gift that is not linked to the completion of the survey interview, whereas a conditional incentive is handed over after the interview is completed as a kind of reward for the respondent's effort. Sometimes an unconditional incentive is provided even a certain time before the actual survey interview is carried out. In this case, a notification of the upcoming interview (regardless of its form) is sent to the respondent by mail and contains the money amount or in-kind gift.

There are several theoretical approaches to explain the effect of incentives on respondents to a survey interview. Weinreb *et al.* (1998) maintain that the fact of gifting respondents in a survey triggers two things: first, it stresses the instrumental nature of the interviewer-respondent relationship in the eyes of the latter and, second, it represents an attempt to ease the imbalance of that relationship. These authors argue that the relationship between interviewer and respondent is unequal because it is solely the interviewer (or rather the researcher) who imposes the rules of the interview and profits from its results. The incentive is, therefore, a means of reducing this inequality and thus to raise the position of the respondent. Consequently, one approach to theoretically explain incentive effects in surveys assumes that respondents conduct a rational *cost-benefit analysis* of the interview situation and take the incentive as a benefit of the completion of the interview (Biner and Kidd 1994). Since the incentive raises the benefits while the costs (in the form of time spent and cognitive effort) remain unchanged, the likelihood of taking part in the survey rises. This theory would imply a linear relationship between the value of the incentive and the response rate of a survey, which is not unambiguously supported by the empirical literature (see below). Therefore, another explanation originates in social exchange theory, in which an incentive paid before the interview is regarded as an *expression of trust* of the interviewer. The fact that such a 'token of appreciation' (Ryu *et al.* 2006) is provided places the survey in a social context and thus motivates the respondent to put more effort into answering the survey questions in exchange (Shettle and Mooney 1999). Related to this theory is the idea of the incentive invoking a *norm of reciprocity* (Gouldner 1960, Wetzels *et al.* 2008). After

receiving the incentive, the respondent feels compelled to return this favour by giving something back; he feels the 'gratitude imperative' of receiving a gift (Schwartz 1967) and therefore responds to this expression of trust with higher effort and more willingness to comply with the request to take part in the survey.[1] Mangione (1995) emphasises another theoretical consideration. He states that the above interpretation of the gift as a token of appreciation might only apply to small money amounts, which are clearly below any reasonable wage level. Once the paid amount reaches typical wage levels, the respondent might see the gift as some form of compensation that he has 'deserved' in return for his effort. In this case, the request to complete the questionnaire looks like a job offer, which he might as well turn down. So, Mangione (1995) concludes that higher monetary gifts might also have a negative effect on response rates.

Apart from the survey literature, several theoretical approaches to explain reciprocal behaviour have been developed in the field of game theory. Individuals are ready to forgo part of their own benefit in order to respond to the (positive) behaviour of others either because they have an aversion against inequity (Fehr and Schmidt 1999, Bolton and Ockenfels 2000) or because they react to the intentions of others (Rabin 1993, Dufwenberg and Kirchsteiger 2004). Furthermore, this strand of literature explicitly distinguishes reciprocity from cooperation, retaliation and altruism. While cooperation or retaliation in repeated interactions is driven by the desire to increase future utility, reciprocity is a reaction to behaviour in the past which is not necessarily motivated by further interactions in the future. Altruism is not triggered by past kind or unkind behaviour but is rather a 'form of unconditional kindness' (Fehr and Gächter 2000). In a very detailed and most interesting survey on reciprocity, Kolm (2006b) identifies three different reasons or motives for reciprocity: (1) 'comparative, matching, compensatory, or balance reciprocity', where returning a favour received before aims at re-establishing a balance between two parties which has been disturbed by the initial favour; (2) 'liking reciprocity' where you give something to a person because you like her or him (the liking can result from a gift you obtained from her before or from some other reason) and (3) 'continuation reciprocity' where you return a gift or favour and at the same time expect your gift to be returned again and so on (Kolm 2006b, pp. 421–422). The introductory gift in CVM surveys obviously aims at invoking the first category, i.e. compensatory reciprocity.

2.2. *Empirical evidence of the impact of respondent incentives in surveys*

Experimental studies done in the field of survey methodology so far robustly find incentives to raise response rates regardless of the administration mode of the survey with unconditional incentives performing better than conditional ones (Church 1993, Singer *et al.* 1999, Simmons and Wilmot 2004, Teisl *et al.* 2006). Another regular finding is that cash incentives work better in decreasing overall non-response than in-kind incentives (Singer *et al.* 1999, Ryu *et al.* 2006). Ryu *et al.* (2006) explain this with the general usability of money as compared to specific in-kind gifts. In addition, when employing the latter, researchers have to be careful when selecting the specific gift to be used, since its symbolic meaning may change according to different contexts and respondents (Weinreb *et al.* 1998). Regarding the effect of the value of the incentive on response rates, the empirical literature offers differing insights. While most studies have found that the higher the value of the incentive the higher

the response rate (Yu and Cooper 1983, James and Bolstein 1990, Wetzels *et al.* 2008), other studies did not detect such a positive relationship (Stratford *et al.* 2003, Hidano *et al.* 2005). Concerning the quality of the data, there is much evidence that respondent incentives at least do not foster response bias and often improve response completeness and accuracy by reducing item non-response (James and Bolstein 1990, Shettle and Mooney 1999).

Evidence of the fact that the norm of reciprocity provides a more plausible explanation of reciprocal behaviour than a rational cost-benefit analysis is also provided by research in experimental economics. In this framework, several classical laboratory experiments can be employed to investigate why people behave reciprocally, such as the ultimatum game (e.g. Camerer and Thaler 1995), the gift-exchange game (Fehr *et al.* 1993, Falk 2007, Alpizar *et al.* 2008, Nicklish and Salz 2008) or the trust or investment game (Berg *et al.* 1995). Empirical evidence in all of these games shows that individuals regularly deviate from purely self-interested behaviour and respond to kind actions of others with the same kind behaviour. In a field experiment involving charitable donations, Falk (2007) mentions the 'gift-exchange hypothesis' referring to the fact that donations can be expected to be more likely when a gift is provided with the charitable organisation's appeal for funds than when no gift is provided. The data support this hypothesis. In a field experiment involving contributions to a national park in Costa Rica, Alpizar *et al.* (2008) find that the provision of small gifts only marginally increases voluntary contributions. Taking the cost of the gifts into account, the authors conclude that such a procedure is not economical from the perspective of the researcher.

In the field of survey-based environmental valuation, the choice of the appropriate value of the incentive is very difficult because the researcher must avoid creating a feeling of coercion in the respondent by giving an amount that is far too high. This means that the *norm of reciprocity* must not become compulsion (Whittington 2004). Besides these ethical considerations, the behavioural effects of monetary and in-kind respondent compensation in environmental valuation surveys have received but little attention so far. In an experimental two-wave CVM study, Hidano *et al.* (2005) demonstrate the effects of reciprocity on respondent motivation and thus on their cognitive effort. In their study, reciprocity is induced by both an up-front payment to the respondent and by an especially nice and friendly treatment of the respondent by the surveyor. The results show that a high unconditional payment compared to a low payment significantly increases two out of four measures of respondents' cognitive effort. However, these results were not compared to a sample without gift provision.

2.3. *Methodological approach of this study*

The present study aims at a systematic investigation of the consequences of providing respondent incentives in CVM surveys following the above-mentioned five research questions. This study should provide a basis for the researchers' decision whether to provide an incentive or not and, if yes, which kind of incentive. To this end, we adopt a field experimental approach to study the influence of reciprocity on CVM survey responses. We employ a split-sample procedure with five different treatments randomly assigned to the respondents. In addition to a control group of respondents that did not receive an incentive (the base version), two treatments were administered with monetary incentives (high- and low-value cash amounts) and two split samples

were administered with in-kind presents (high- and low-value gifts equivalent in value to the two monetary incentives) (cf. Table 1). Within this experimental setting, we then analyse the effects of the different treatments on a number of indicators for respondent effort, data quality and, finally, the WTP statement.

3. Empirical study

3.1. *Project description*

We apply our research approach in a CVM survey aiming at an assessment of the social value of the conversion of rubber plantations into natural forests in Xishuangbanna, Yunnan Province (Southwest China), counteracting the widespread deforestation in that area. Deforestation as a result of rising demand of agricultural land is an often reported environmental problem. In the case of tropical Southeast Asia, one of the main drivers of this development is the cultivation of rubber trees (*Hevea brasiliensis*). Xishuangbanna Prefecture, which is located at the southernmost rim of Yunnan Province in China, has also been witnessing this rapid expansion of rubber monocultures at the expense both of the formerly tropical rainforest coverage and traditional systems of shifting cultivation.

As a consequence of the special climatic conditions of the area as a transition zone between the tropics and subtropics, Xishuangbanna abounds in plant and animal species and has long been recognised as a biodiversity hotspot. While it only accounts for 0.2% of the land area of the People's Republic of China, the region is home to 25% of all plant species in the country (Xu 2006). The major part of the area is covered by different subtypes of tropical forest, which is the main ecological characteristic of that region. This flora and fauna make Xishuangbanna an ecologically and geographically special region in China.

However, this traditional setting has been disturbed in recent years by the fast spreading of rubber monocultures. Since the price for natural rubber continues to be very high and since it is possible to cultivate rubber trees even on steep mountain slopes, more and more primary and secondary forest land has been transformed into rubber plantations. In addition to the undeniable economic benefits for the rubber farmers and the region as a whole, this trend, which has continued into the new century, entails a multitude of negative ecological and environmental consequences. First and foremost, the replacement of natural forests and traditional shifting agricultural land by both large-scale and small-scale rubber plantations leads to a huge loss of biodiversity (Ziegler *et al.* 2009). Moreover, the existence of monocultures threatens the whole hydrological system of the area. This includes the problem of increased precipitation run-off, which reduces rainwater infiltration (Ziegler *et al.* 2009), and the increased use of pesticides and chemical fertilisers in the plantations, which endangers water quality in local rivers and streams. The clearing of forest on sloped land further leads to soil erosion, increasing also the risk of landslides (Ziegler *et al.* 2009). Overall, it becomes clear that the economic benefits of

Table 1. Classification of respondent gifts.

Value/type	Monetary	In-kind
High	30 RMB	Bath-towel
Low	15 RMB	Washing powder

rubber cultivation, which are obvious in the region, are bought at an ever increasing ecological and environmental price.

The scenario to be evaluated by respondents in the present study is a reforestation project implemented in a nearby nature reserve area. The 'Return Rubber into Forest' project as it is called in the survey was designed to resemble the sloping land conversion programme (Bennett 2008), a policy measure implemented nationwide by the Chinese government and well known to the survey population. During the survey interview, respondents were informed that existing rubber plantations in the nature reserve area would be transformed back into forest and that the following consequences could be expected from this renaturation effort. First, the original forest area would be partially restored, which would provide habitat for a number of rare plant and animal species. In addition, reforestation would lead to better water quality in local rivers because less pesticide would have to be brought out. This would further result in less pesticide contamination in agricultural food products and the whole local ecosystem.

Subsequently, the payment vehicle is introduced. Respondents are informed that a fund would be set up by the local government, to which all citizens would have to contribute. The payments would have to be made every three months over a time-span of five years. The WTP statements have to be made on a payment card (PC). The exact wording of the elicitation question as well as the PC are displayed in Figure A1 in the appendix. These payment specifications were the result of a number of in-depth interviews with local citizens and several rounds of so-called citizen expert group (CEG) meetings (Ahlheim *et al.* 2010). In these discussion meetings, features of the survey study and the questionnaire were discussed with a group of citizens who are representative of the survey population. Valuable insights could be gained regarding the structure and wording of the questionnaire as well as the type of gifts used for the reciprocity experiments.

The questionnaire used for this survey consisted of five parts. After an introduction to the purpose of the study, the first part contained questions regarding the respondent's knowledge and familiarity with the environmental problem. After that, parts two and three introduced the project scenario and the payment scenario to the respondent, respectively. Part four, the elicitation questions, forms the core of the interview, in which the respondent was presented the PC and asked to indicate his maximum WTP for the proposed reforestation project. The last part consisted of a series of demographic and attitudinal questions that aim at an assessment of potential determinants of WTP.

3.2. *Survey and treatment implementation*

The survey was conducted in early summer 2009. All interviews were carried out in-person by a group of local interviewers who were recruited and trained especially for the purpose of this survey. In order to ensure the representativeness of the results with respect to the overall population of the study area, a random sample of households was drawn. The local government provided a complete list of all housing units in the urban area of Jinghong, the prefectural capital, indicating how many households reside in each unit. Based on these data, a random list of addresses was generated and the interviewers were sent specifically to those designated addresses. In case the selected household could not be interviewed, interviewers were told to approach the neighbouring household. The gift was only presented to the respondent

after agreeing to be interviewed, i.e. it was not used to increase the likelihood of a selected respondent to take part in the survey. Interviews were conducted seven days per week in the late afternoon and early evening when most people are at home.

As to the monetary gifts, the specified amount of cash (30 RMB or 15 RMB[2]) was handed to the respondent in an envelope. The two main criteria for the selection of suitable in-kind gifts were that they should be usable by all respondent households and that their value is sufficiently obvious to respondents. In discussions with local citizens during and after the CEG meetings, it became clear that these criteria are fulfilled best by a 1 kg bag of washing powder worth 15 RMB and a bath towel worth 45 RMB.

In those treatments where a gift was provided, respondents were informed about this in the introduction to the interview and the gift was shown to them. The gift was handed over regardless of whether the interview was completed or not, i.e. as an unconditional incentive. Especially in the rather rural districts of the survey area, we faced the risk that news about the provision of gifts might spread while the survey is still being conducted. In order to avoid such biasing effects, interviews in those districts were completed in a single day with an appropriately high number of interviewers working simultaneously. The aim of this procedure was to prevent that respondents who already know about the gifting would expect any type of compensation when accepting to be interviewed. Altogether, it was planned to conduct a total of 1000 interviews equally distributed among the five treatments, i.e. 200 interviews per treatment.

3.3. *Hypotheses under investigation*

In general, treatment effects are the differences in experimental outcomes with and without treatment and can have different forms. Consequently, the influence of respondent incentives in a CVM context can be analysed with respect to a range of criteria. The overall objective should be to find that type of interview setting (i.e. respondent gift) which increases respondents' level of thought and resulting data quality but leaves their WTP statements unbiased, i.e. leads to truthful WTP answers. In the introduction and in section 2, we discussed the way respondent incentives might invoke reciprocal behaviour and thus might pressurise the respondent who has received a gift prior to the interview to 'pay something back' when completing the questionnaire. At this point the question arises, which strategies of 'paying back' respondents actually use. In this study, we consider three different kinds of possible reciprocal behaviour of CVM respondents:

Behaviour 1: Respondents are motivated by the incentive to put more effort into answering also difficult questions.

Behaviour 2: Respondents do not value the presented scenario at all but, nevertheless, feel obliged now by the material incentive to state a positive WTP instead of zero.

Behaviour 3: Respondents who would state a positive WTP even without material incentives now feel obliged by the incentive to state a higher than their true WTP.

Behaviour (1) is the kind of behaviour we intend to induce in the respondent by providing material incentives to respondents: It leads to an increase in the response rates of sensitive and cognitively challenging questions and possibly to better reflected answers. This reduction of item non-response increases the data quality of

the survey. This behaviour will be measured by a comparison of the response rates of such questions across the five treatments. Behaviour 1 corresponds with research questions 1–4 explained in the introduction in section 1. Behaviours 2 and 3, in contrast, are undesired and should be avoided. They represent biases of stated WTP since respondents report a higher than their true WTP. These two kinds of behaviour correspond with research question 5 in section 1.

To scrutinise the effects of behaviours 2 and 3, we will compare stated WTP across treatments, i.e. the fraction of zero responses, mean WTP and the distribution of WTP statements. Adopting a positive perspective on the reciprocal behaviour of respondents in CVM surveys, we want to test the following three hypotheses which refer to the three kinds of behaviour mentioned above:

- **(H1)** Both monetary and in-kind incentives increase the effort respondents put into answering the questionnaire.
- **(H2)** The provision of monetary as well as in-kind incentives increases the likelihood that people state a positive WTP as compared to the base treatment without such incentives.
- **(H3)** The provision of monetary and in-kind incentives increases the average stated WTP as compared to the base treatment without such incentives.

4. Results

4.1. Socio-demographic characteristics of the split samples

As shown in Table 2, our survey falls slightly short of the planned number of interviews due to some unusable datasets in every treatment. The table also displays means and standard deviations of major household characteristics across the four treatments and the control group.[3] While mean number of household members, level of education, household income in RMB and the fraction of male respondents do not differ significantly, the Kruskal-Wallis test rejects the null hypothesis of equal means for respondent age at the 1%-level and number of children at the 5%-level of confidence. That means that except for these household characteristics, the five split samples do not differ significantly.

4.2. The influence of incentives on respondents' effort

As mentioned above, a criterion frequently applied to test the influence of respondent incentives is the response rate to certain questions in the survey. The upper part of Table 3 provides response rates to sensitive questions asking for the WTP statement, household income and ethnicity of the respondent. Correspondingly, the lower part of Table 3 shows the fractions of respondents who completed all items of cognitively challenging question sets, such as the evaluation of the single scenario elements, environmental attitudes or a psychological scale to assess respondents' propensity to answer in a socially desirable manner.[4] It can be seen that for all questions under investigation, response rates are higher in the incentive treatments compared to the control group, albeit not all differences are significant. Looking only at significant increases in response rates, the low monetary treatment shows the best results. Except for the elicitation question, all rises in response rates are significant as compared to the control group. Although the other incentive

Table 2. Household demographics across the treatments (Chi-squared and Kruskal-Wallis Tests).

	Control	15 RMB	30 RMB	Powder	Towel	Kruskal-Wallis test		
						Chi^2	df	p-value
N	196	194	185	196	198			
Age (SD)	38.05 (0.89)	35.92 (0.89)	33.82 (0.88)	36.96 (0.83)	34.90 (0.79)	17456	4	0.002
Household members (SD)	3.18 (0.12)	3.24 (0.11)	3.09 (0.10)	3.36 (0.10)	3.03 (0.10)	6001	4	0.199
Children (SD)	0.95 (0.06)	0.86 (0.06)	0.74 (0.06)	1.02 (0.06)	0.82 (0.05)	12940	4	0.012
Education (SD)	3.98 (0.09)	3.91 (0.09)	3.92 (0.07)	3.98 (0.09)	3.96 (0.09)	556	4	0.968
Household income (SD)	3001 (175)	3003 (217)	2646 (152)	2465 (134)	2698 (165)	5881	4	0.208
	Control	15 RMB	30 RMB	Powder	Towel	Chi^2 df	asymptotic significance	Exact significance
Male (SD)	0.48 (0.04)	0.41 (0.04)	0.38 (0.04)	0.44 (0.035)	0.49 (0.04)	4	0.128	0.129

Table 3. Response rates to sensitive and cognitively challenging questions (*p*-values for two-sided *t*-tests in comparison to the control group).

	Control	15 RMB	p	30 RMB	p	Powder	p	Towel	p
Sensitive question									
WTP question	97.0%	98.0%	0.544	99.5%*	0.072	99.5%	0.059	99.5%*	0.061
Household income	86.1%	93.4%**	0.016	90.3%	0.204	90.4%	0.192	91.0%	0.131
Ethnic group	98.5%	100.0%*	0.086	98.9%	0.722	99.0%	0.674	99.0%	0.666
Question set									
Scenario evaluation	96.5%	99.5%**	0.035	99.5%**	0.043	99.0%	0.100	99.0%*	0.097
Scenario rating	98.0%	100.0%**	0.047	100.0%*	0.054	99.5%	0.187	99.0%	0.423
Environmental attitudes	87.1%	92.4%*	0.081	93.5%**	0.034	89.3%	0.495	93.5%**	0.032
Social desirability	82.7%	90.4%**	0.024	87.6%	0.172	87.8%	0.149	87.9%	0.137

Note: **, * indicate confidence at the level of 5% and 10%, respectively.

treatments lead to a significantly higher response rate for the WTP question, there are fewer significant differences regarding the other questions.

These results support our hypothesis (H1) in that we can observe a significantly positive effect of the incentives on respondent efforts as measured by significantly decreasing item non-response rates. A comparison of the different incentive treatments suggests that this effect is largest under the low-value monetary incentive (15 RMB) and in general rather limited under the in-kind incentive treatments.

4.3. *The influence of incentives on stated WTP*

Next, we analyse the effect of incentive provision on WTP statements, mean WTP and the form of WTP distribution across treatments. Mean WTP is estimated following the maximum-likelihood approach of Cameron and Huppert (1989). However, for our estimations, we chose to use the linear probit specification due to the recommendations by Crooker and Herriges (2004). Table 4 shows the estimates of mean WTP for the five treatments. While the low cash amount of 15 RMB in the LO_MONEY treatment exhibits virtually the same mean WTP as the control group, mean WTP estimates in all other treatments differ; however, only the lower WTP of the low in-kind treatment (LO_INKIND) in comparison to the control group is significant. As we see from Table 4, mean WTP of the HI_MONEY and the HI_INKIND treatment are higher than mean WTP of the control group, but the differences to the control group are not significant.

Greater and significant differences can be observed for the fraction of zero-WTP statements across the treatments. Here, it shows that all incentive treatments exhibit a lower fraction of zero responses as compared to the control group, most of which are quite drastic. Yet, except in the low in-kind treatment, no significant effect on the fraction of zero responses is observed. Thus, the information contained in Table 3 is somewhat inconclusive. While no significant increase in mean WTP compared to the control group is observed (we even see a significant decrease for the low in-kind treatment), there seems to be a strong effect on the propensity of respondents to state positive versus zero WTP amounts when confronted with an incentive. It is, therefore, necessary to analyse the WTP responses across the five treatments in more detail. Figure 1 displays the relative frequencies of WTP statements for each treatment separately.

Table 4. Mean WTP estimates and zero-WTP responses across treatments.

Treatment	N	Mean WTP	Fraction of zero-WTP statements
Control group	196	41.17	21.94%
LO_MONEY (15 RMB)	194	40.66	12.37%**
HI_MONEY (30 RMB)	185	46.22	8.11%***
LO_INKIND (Washing powder)	196	29.06**	19.90%
HI_INKIND (Bath towel)	198	43.35	13.13%**

Note: The 1% (***) and 5% significance levels (**) indicate significant differences of the fraction of zero-WTP statements in the treatments in comparison to the control group in two-sided *t*-tests.
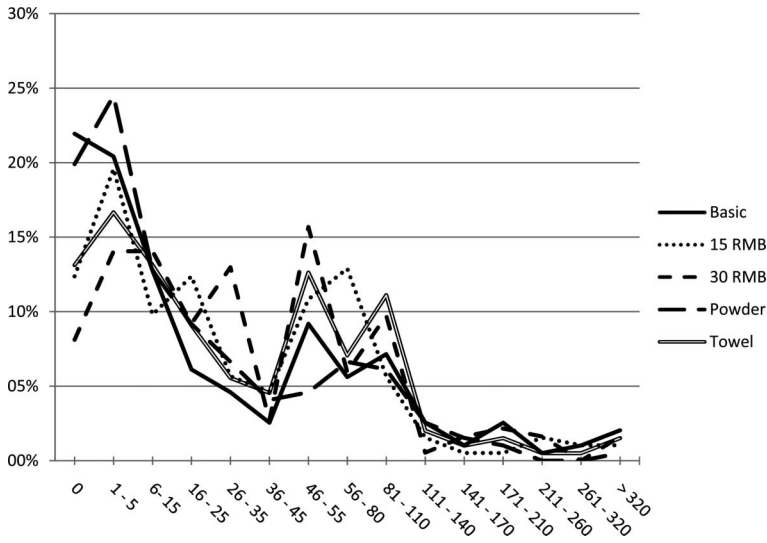
Figure 1. Relative distribution of WTP responses.

4.4. *An econometric model of the two-step decision of WTP*

In order to account for the two potential biasing behaviours (2) and (3), we apply a special regression model. Here, it is assumed that the respondent selects a specific WTP amount in a two-step decision process. As a first step, he decides whether to state a positive WTP or to state zero. In case, the respondent is generally willing to pay for the proposed project, he selects the specific amount in the second step of the decision process. The determinants of the decision process either to select a positive amount or not may well be different from the ones of deciding about the specific WTP amount. This is especially the case when respondents are given an incentive since, as explained above, it may lead either to behaviour (2) or (3) or even both. The appropriate estimation model to detect the two separate sets of determinants of both processes is a two-step selection model based on Heckman (1979). By applying this approach, it is possible to simultaneously estimate the respective factors that influence the two decision processes of stating WTP. The model can be written as follows (cf. Heckman 1979, Greene 2003):

$$z_i^* = a'w_i + u_i \tag{1}$$

with

$$z_i = \begin{cases} 1 \ \textit{if } z_i^* > 0 \\ 0 \ \textit{if } z_i^* = 0 \end{cases} \tag{2}$$

$$y_i = \beta'x_i + e_i \quad \text{if } z_i = 1 \tag{3}$$

where

$$e_i, u_i \sim N[0, 0, \sigma_e^2, \sigma_u^2, \rho] \tag{4}$$

Equation (1) is the so-called selection equation and models whether respondent i chooses a positive WTP ($z_i = 1$) or zero WTP ($z_i = 0$). The vector w_i denotes the variables explaining the selection process and a the respective coefficients (determinants). Equation (3), often termed outcome equation, models the specific (positive) WTP amount y_i stated by respondent i, the vector x_i denotes the explanatory variables and β the respective coefficients of this process. ρ stands for the correlation coefficient between the error terms in both equations, e_i and u_i. The expected WTP given that it is positive can then be modelled jointly and can be expressed as

$$E\left[y_i | z_i^* > 0 \right] = \beta' x_i + \rho \sigma_e \lambda_i \left(-\frac{a' w_i}{\sigma_u} \right) \tag{5}$$

with $\lambda_i \left(-\frac{a' w_i}{\sigma_u} \right) = \frac{\phi \left(\frac{a' w_i}{\sigma_u} \right)}{\Phi \left(\frac{a' w_i}{\sigma_u} \right)}$ denoting the inverse Mill's ratio. Estimating Equation (3) then yields both the coefficient estimates β of the outcome equation as well as the coefficients a of the selection equation in a joint estimation process. From these coefficient estimates, the potential influences of behaviours 2 and 3 on stated WTP can be analysed. For both sets of coefficients, the marginal effects can be computed, as well.

4.5.   Results of the two-step model for reciprocity

As already shown in Table 4, the relative frequency of zero-WTP responses is lower in all treatments as compared to the control group. Obviously, the provision of a gift increases the likelihood of observing behaviour (2), i.e. stating a positive WTP amount. This increase (corresponding to a lower fraction of responses in the first interval) is most pronounced in the high-value monetary treatment (HI_MONEY). From Figure 1, it can now well be observed that these reduced fractions of zero-WTP statements consistently correspond to much higher frequencies of responses in the first positive interval on the PC, i.e. 1–5 RMB, when incentives are used. We can even observe that now the responses in this interval have the highest relative frequency of the whole WTP distribution in every incentive treatment. From this observation, it must be concluded that incentives significantly induce some respondents not to state a zero-WTP (which they would have stated in the case of no incentives) and shift their response into the first interval of positive WTP amounts. Thus, we clearly observe behaviour (2) in our treatments; however, the consequences of this behaviour appear to be negligible since the induced shift of WTP statements is very small.

The results concerning the assumed behaviour (3) are more complex. Therefore, in a next step, we will analyse the effects of extrinsic incentives on the decision to state a positive WTP and on the stated WTP amount jointly in a Heckman two-step model as laid out above. In this model, we aim to identify the determinants that drive the two processes and investigate whether they differ systematically.

Table 5 shows the results of two different model specifications. In these models, the independent variable, *posWTP*, in the selection equation is equal to one if the respondent states a positive WTP and zero for respondents selecting '0 RMB'. The dependent variable of the second step model, the outcome equation, is the midpoint of the PC interval selected by the respective respondent. The left-hand side of the

Table 5. Two-step regression models of WTP statements.

	Model 1 ($N = 871$)		Model 2 ($N = 681$)	
	Coefficient	*p*-value	Coefficient	*p*-value
Outcome equation: dependent variable: WTP interval midpoint				
AGE	−0.488*	0.093	−0.361	0.317
MALE	2.690	0.659	6.103	0.456
MARRIED	−13.299*	0.051	−15.031*	0.079
CHILD			9.678	0.252
EDUCATION	8.145***	0.003	9.247***	0.006
INCOME	0.006***	0.000	0.005***	0.004
UNCONCERN			4.538	0.294
INSTRUMENT			−4.050	0.253
EMOCARE			−5.770	0.245
OBJECTIVE			−2.056	0.558
LO_MONEY	−5.625	0.558	−14.035	0.267
HI_MONEY	−4.451	0.648	−11.710	0.364
LO_INKIND	−14.537	0.140	−20.776*	0.081
HI_INKIND	−1.274	0.894	−6.648	0.588
CONSTANT	33.627**	0.058	32.091	0.190
Selection equation: dependent variable: pos WTP				
SATIS	0.246***	0.001	0.247***	0.008
TAXES			−0.662***	0.000
MALE			−0.447***	0.001
UNCONCERN			−0.128**	0.024
EMOCARE			0.205***	0.000
LO_MONEY	0.411**	0.011	0.526**	0.011
HI_MONEY	0.603***	0.001	0.733***	0.001
LO_INKIND	0.021	0.890	0.104	0.575
HI_INKIND	0.354**	0.026	0.354*	0.067
CONSTANT	−0.028	0.915	0.649*	0.060
rho	−0.092		0.042	
Test_rho	0.505		0.767	

Note: ***, **, * indicate confidence at the level of 1%, 5% and 10%, respectively.

table (model 1) is a basic model including in the selection equation only the treatment dummies and one variable that is not included in the outcome equation (SATIS).[5] It turns out that all coefficients except the one of the low-valued in-kind gift treatment are significantly positive, meaning that the probability of stating a positive WTP response is significantly higher in the two monetary and in the high-valued in-kind gift treatments compared to the control group. This result confirms the observation in Figure 1, that these three treatments substantially reduce the fraction of zero responses relative to the control group without incentive.

The interpretation of these findings is, however, open to some speculation. When facing zero WTP statements, it is rarely known with certainty if these are protest zeros or 'serious' zeros which represent respondents' true assessment of the public project in question. In the latter case, respondents would be willing to pay for the project, in principle, but even the lowest payment interval stated in the PC seems too high for them in the light of the benefits they expect from that project. This argument presupposes, of course, that respondents when ticking a certain interval in the PC implicitly assume that this signals their WTP also an amount equal to the upper limit of the respective interval (e.g. 5 RMB in the first positive interval of the PC used in

this study). Now, one could speculate that protesters on the one hand and 'true zero' respondents on the other react differently to the provision of a gift for their participation. The latter, unlike the protesters not being opposed to the project in principle, may feel inclined to state the lowest possible WTP in reciprocation of the gift. Clearly even this small shift in response behaviour would result in a biased WTP. Protesters, however, cannot be appeased in their opposition by a simple gift and would still select zero. Trying to highlight this possibility might be of interest for future research.

Table 6 shows the marginal effects of this selection model, i.e. the extent to which the likelihood of stating a positive WTP amount changes from the treatment with no incentive in the base version to the treatments where respondent incentives are provided. As can be seen, the provision of the high-value monetary incentive clearly has the strongest impact on the likelihood of stating a positive WTP. The quantitative impact of the small money amount is approximately equal to that of the high-value in-kind gift. A comparison of only the monetary gifts reveals that the high amount exhibits a much stronger effect on *posWTP* than the low money amount. This shows that there is a clear and strong positive relationship between the value of the monetary incentive and the likelihood of stating a positive WTP.

Looking at the outcome equation of model 1 in Table 5, the effect of certain demographic variables on the amount of WTP can be seen. While the level of education (*EDU*) and household income (*INCOME*) as expected have a significantly positive influence, the fact that the respondent is married (*MARRIED*) has a negative effect on WTP, which is a somewhat surprising and unusual result in the context of the valuation of environmental goods. Concerning the different incentive treatments, it turns out that no significant effect on the specific WTP amount can be found. In model 2, however, we observe that only the LO_MONEY treatment is associated with a significantly lower WTP. The important result here is that although these incentives increase the likelihood of stating a positive WTP (as shown in the selection equation), they do not significantly influence the specific amount once the decision to state a positive WTP has been made.

To check for the robustness of these results, we extend the regression model and include a larger set of explanatory variables both in the selection and the outcome equation (model 2). Regarding the selection equation, the likelihood of stating a

Table 6.   Marginal effects of the first-step selection model.

	Model 1		Model 2	
	Effect	*p*-value	Effect	*p*-value
TAXES			−0.130***	0.000
MALE			−0.088***	0.000
SATIS	0.056***	0.002	0.049***	0.008
UNCONCERN			−0.025*	0.022
EMOCARE			0.040***	0.000
LO_MONEY	0.096***	0.010	0.103***	0.010
HI_MONEY	0.141***	0.000	0.145***	0.001
LO_INKIND	0.005	0.884	0.021	0.573
HI_INKIND	0.082*	0.026	0.070*	0.066

Note: *** and * indicate confidence at the level of 1%, 5% and 10%, respectively.

positive WTP is positively influenced by the overall level of life satisfaction of the respondent (SATIS) and the environmental attitude factor *EMOCARE*. The latter taps a feeling of emotional care for the natural environment in the respondent. On the contrary, the fact that respondents think that local residents are already paying enough taxes (*TAXES*), that the respondent is male (*MALE*) and the environmental attitude factor *UNCONCERN* significantly lower the probability of stating a positive WTP. The latter factor assesses the degree to which a respondent is mindlessly unconcerned about current environmental problems. In the outcome equation in the upper part of Table 5, none of the newly included explanatory variables has a significant effect on WTP. Both from a general perspective and regarding the effects of the incentive treatments, model 2 confirms the findings of the first model. The fact that the same pattern of significant dummy variables can be found when including further explanatory variables into the model is evidence for the robustness of the above results.

4.6. Further aspects of reciprocal behaviour

While in our field experiments we found evidence of behaviour (2) but not of behaviour (3), we want to investigate a further aspect that emerged from an observation of the WTP distribution graphs of each single treatment (Figure 1). The distribution of the HI_MONEY treatment where respondents were given an up-front incentive of 30 RMB shows a peak at the 26–35 RMB interval which appears only in this treatment. This peak is significant only for the HI_MONEY treatment as can be seen from the regression results (Table 7) of a probit model where the variable BID30, i.e. a binary variable indicating whether the respondent has chosen the interval around 30 RMB, is used as the dependent variable.

This observation leads to the suspicion that in the HI_MONEY treatment some respondents were especially attracted to select the interval as their WTP that corresponds to the paid incentive. Such behaviour may be the result of two different kinds of psychological processes: (1) respondents may regard the amount of the paid incentive as an anchor for their WTP response. It has been shown in the literature that in the absence of well-formed preferences for environmental goods, respondents are often influenced by certain information given to them, e.g. in the form of costs of environmental or other goods or proposed amounts when applying the dichotomous-choice elicitation format (van Exel *et al.* 2006, Arana and Leon 2008). Maybe the specific money amount paid as incentive in our field experiment in the

Table 7. Test of the incentive effect on the BID30 interval.

Dependent variable: BID30 ($N = 969$)	Coefficient	p-value
LO_MONEY	0.103	0.629
HI_MONEY	0.558***	0.004
LO_INKIND	0.182	0.381
HI_INKIND	0.093	0.663
CONSTANT	−1.686***	0.000
Pseudo R-squared	0.023	

Note: *** indicates confidence at the level of 1%.

HI_MONEY treatment serves as a monetary cue to the respondent for finding an appropriate WTP amount for the proposed project. Or, alternatively, (2) respondents may have had the intention and desire to pay back the amount received as incentive and state a WTP amount that returns the favour received. Since such behaviour would constitute a direct reciprocal effect on the incentive received, we term this behaviour 'direct reciprocation'. Ironically, if this kind of reasoning was the underlying motivation of respondents' WTP, it would result in a drastic over-payment compared to the (monetary) favour received, since the payment scenario provides that the stated amounts are to be paid every three months over the next five years.

Thus, we show that, in our study, the specific incentive amount can serve as an attractor for some respondents (here about 9% of respondents) when selecting their individual WTP amounts on the PC. At this point, however, it is unclear whether the underlying reason is anchoring or rather some kind of direct reciprocation. We suggest that future CVM surveys using monetary incentives should add more specific questions in the survey regarding respondents' perception of the incentive received in order to shed light on this issue.

5. Discussion and conclusions

In this study, we wanted to scrutinise the effects of material incentives on respondent behaviour in CVM surveys. Experimental as well as model-based theoretical studies found in the literature show contradictory results regarding the effects of material incentives on the compliance of candidates in experiments who are asked to fulfil some specific task. The CVM surveys represent a principal-agent setting where interviewers are the principals who ask respondents (the agents) to answer their questions as conscientiously and truthfully as possible. Like in the traditional principal-agent model, the efforts of respondents cannot be judged directly by the principals. Therefore, we took the fact whether certain more complicated questions were answered or not as an indicator for respondent conscientiousness. We confronted four different incentive treatments (low money payment, high money payment, low-price in-kind gift and high-price in-kind gift) with the performance of a control group where no material incentives were provided. Based on five research questions which resulted from the respective literature, we analysed respondent reactions to material incentives provided before a CVM interview.

Our results regarding respondent compliance in terms of item non-response are as mixed as could be expected from the literature. The best performance in the sense of the lowest item non-response rate was reached by the low money payment of 15 RMB. This performance was significantly better than the control group in most items at the 5% level and in all items at the 10% level. The performance of the high money payment (30 RMB) was worse than that of the low money treatment but still in two items better than the control group at the 5% significance level and in four items better than the control group at the 10% level. This result is rather puzzling considering the findings from earlier laboratory experiments as cited above. One would expect that money incentives create a market exchange framing of the interview situation where higher payments should trigger higher efforts and low money payments should perform even poorer than no payments where social norms might induce respondents to cooperate. The high-value in-kind gift (towel) performed significantly better than the control group at the 5% level in only one

item and at the 10% level in three items followed by the low-value in-kind gift which surpassed the control group in only one item at the 10% level. So we have a clear ranking with the low money payment treatment showing the best performance followed by the high money payment and the high-value in-kind gift, while the low-value-in-kind gift shows no effect at all at the 5% significance level as compared to the control group and only one at the 10% level.

Answering our first research question (Do extrinsic incentives trigger respondents' efforts in answering CVM questions?), we can say that all but one respondent incentives have a significantly positive effect on respondent compliance in the sense that they tend to lower the item non-response rate as compared to the control group. This means that from our study we cannot confirm the wide-spread crowding-out hypothesis for CVM surveys, since none of the treatments with a material incentive lead to a worse performance as compared to the control group. Instead it seems that traditional reciprocity considerations and feelings of gratitude determine respondents' reactions to the incentives offered.

Regarding the second research question (What has a more favourable effect on respondents' diligence in answering CVM questionnaires, money or in-kind gifts?), we find that money shows a better performance than in-kind gifts of the same value. This demonstrates that the doubts regarding money as an incentive arising from other contexts (cf. Heyman and Ariely 2004, Ariely 2008 or Gneezy *et al.* 2011) cannot be confirmed for CVM surveys, at least not from our study.

With respect to the third research question (Do large money incentives on the one hand and small money incentives on the other have different effects on respondents' diligence in answering CVM questionnaires?), our explanations are not as clear and convincing as before. From our study, we cannot confirm the advice of Gneezy and Rustichini (2000) 'Pay enough or don't pay at all' for CVM surveys. While they found in a different experimental environment that no payment performs best, followed by the high payment before the low payment, in our study the low money payment shows the best performance regarding respondent compliance and is followed by high money payment, while both perform better than no monetary incentive at all. The fact that any money incentive is better than no incentive at all can be explained by reciprocity considerations, but it is rather unclear why the 'basic law of behaviour' according to which 'higher incentives will lead to more effort and higher performance' does not seem to hold here. It seems that Mangione's (1995) differentiation between a symbolic low payment and a rather compensating high payment applies to this situation. While the lower value of 15 RMB is interpreted as a nice gesture, already an amount of 30 RMB might be seen as the offer of a deal, which might also be turned down. Further research is necessary to further scrutinise this effect. Things are different with respect to research question 4 (Do expensive in-kind incentives on the one hand and less expensive in-kind incentives on the other have different effects on respondents' diligence in answering CVM questionnaires?). Here, the high-value in-kind gift has a much more favourable effect on respondent compliance than the low-value gift, which is in accordance with the 'basic law of behaviour' as well as with reciprocity considerations.

While our recommendations derived from research questions 1–4 are rather clear (use a low money payment as an incentive to trigger respondent compliance in CVM surveys), we have not yet taken into account possible effects of compliance incentives on stated WTP in the sense of research question 5 (Do material incentives (monetary or in-kind) affect respondents' stated WTP for the public project under discussion?).

Here, we find that the low money payment treatment leads to practically the same average WTP as the control group while the high money payment treatment and the high-value in-kind gift treatment lead to higher average stated WTP than the control group, though these differences are not significant. Most surprising is the effect of the low-value in-kind gift on average WTP which is significantly *lower* than that of the control group. One possible explanation is that the choice of the low-value gift (washing powder) was inappropriate and that this gift was perceived as a kind of insult so that respondents 'paid us back' by understating their true WTP. This shows how important thorough pretesting is when CVM surveys are conducted in foreign cultures.

Summing up, from our study we derive the recommendation to use moderate money payments as incentives to motivate respondents to answer CVM questions conscientiously, so that item non-response rates are minimised. We urgently recommend thorough pretesting in order to assess an amount of money considered appropriate by respondents, since this amount will differ between different social and cultural environments. In contrast to other studies, in our survey in-kind gifts turned out to be much less helpful as incentives than money payments. Also the choice of the 'right' in-kind gift seems to be much more difficult than we expected, so that moderate money payments are our first choice as respondent incentives in CVM surveys.

Notes

1. Note that these explanations for the influence of respondent incentives on survey response rates are not mutually exclusive and that even within one respondent more than one processes may be at work (Shettle and Mooney 1999).
2. 15 RMB is the approximate price for a simple meal in a local street restaurant.
3. A list of all variables employed in this study including descriptions, sample means and standard deviations is provided in Table A1 in the appendix.
4. The propensity of a respondent to answer to survey questions in a socially desirable manner is assessed by a modified version of the Balanced Inventory of Desirable Responding (BIDR) (cf. Paulhus 1991).
5. The variable SATIS, the overall level of life satisfaction, serves as the so-called exclusion restriction in the Heckman model.

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Appendix

The "Rubber into Forest" program will be organized by the NNNR under the guidance of higher levels of government. In order to finance this environmental protection program a fund will be founded to which all citizens of Jinghong will have to contribute. This fund will be organized by the relevant government departments. The money in this fund will be used exclusively for the "Rubber into Forest" program.

Considering the benefits of this program for all people in this region and for you personally, we would like to ask you to mark in the following list how much at most your household would be willing to contribute every three months to this fund for the next five years in order to get the "Rubber into Forest" program realized:

○	0 RMB
○	1 - 5 RMB
○	6 - 15 RMB
○	16 – 25 RMB
○	26 – 35 RMB
○	36 – 45 RMB
○	46 - 55 RMB
○	56 - 80 RMB
○	81 - 110 RMB
○	111 - 140 RMB
○	141 - 170 RMB
○	171 - 210 RMB
○	211 - 260 RMB
○	261 – 320 RMB
○	More than 320 RMB

Figure A1.   Elicitation question and payment card.

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Table A1. Description of variables used in the regression models.

Variable	Description	Mean	SD
AGE	Age of the respondent	35.96	12.051
MALE	Gender of the respondent (1 = male, 0 = female)	0.44	0.497
MARRIED	Marital status of the respondent (1 = married, 0 = not married)	0.62	0.486
CHILD	Does the respondent have a child (1 = yes, 0 = no)	0.66	0.475
SATIS	Level of overall live satisfaction	3.21	0.674
EDUCATION	Level of education	3.95	1.202
INCOME	Household income	2,764	2,295
UNCONCERN	Environmental attitude factor: No concern for environmental problems	0.05	1.027
INSTRUMENT	Environmental attitude factor: Seeing primarily the instrumental value of the natural environment	−0.05	1.033
EMOCARE	Environmental attitude factor: Caring for the environment on an emotional level	0.05	0.995
OBJECTIVE	Environmental attitude factor: Objectively acknowledging the existence of environmental problems	0.00	0.999
LO_MONEY	Treatment dummy: low-valued monetary gift (15 RMB)	–	–
HI_MONEY	Treatment dummy: high-valued monetary gift (30 RMB)	–	–
LO_INKIND	Treatment dummy: low-valued in-kind gift (washing powder)	–	–
HI_INKIND	Treatment dummy: high-valued in-kind gift (bath towel)	–	–
TAXES	Taxes and fees of residents in Jinghong are already so high that there should be no additional financial burden. (1 = yes, 0 = no)	1.38	0.486