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Reclamation in East Germany

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Nr. 245/2004



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Zusammenfassung:

Der Abbau von Braunkohle war und ist prägend für einen großen Teil ostdeutscher Landschaften. Durch Tagebaue werden riesige Flächen einer bestehenden Kulturlandschaft zerstört und müssen nach Beendigung des Abbaus in aufwändigen Rekultivierungsprojekten wieder der Gesellschaft zugänglich gemacht werden. Um den von einem solchen Projekt erzeugten gesellschaftlichen Nutzen, der den Kosten gegenüberzustellen ist, zu erfassen, bietet sich die Contingent Valuation Methode (CVM) an. Mittels der CVM lässt sich die Zahlungsbereitschaft der Haushalte für ein derartiges Projekt ermitteln. Der vorliegende Beitrag gibt eine Übersicht über die Ergebnisse einer Contingent Valuation Studie zur Bestimmung des gesellschaftlichen Nutzens eines konkreten Rekultivierungsvorhabens nördlich der brandenburgischen Stadt Cottbus. In der Studie werden drei Fragen untersucht. Zunächst wird die aggregierte Zahlungsbereitschaft der Bevölkerung für das geplante Rekultivierungsvorhaben ermittelt; insgesamt ergibt sich eine jährliche Zahlungsbereitschaft von 2,7 Millionen Euro. Sodann untersucht die Studie die Determinanten dieser Zahlungsbereitschaft und findet neben dem erwartungsgemäß positiven Einfluss des Einkommens eine Reihe von anderen Einflussfaktoren wie das Freizeitverhalten, die Einstellung zu Staatsausgaben sowie die allgemeine Sorge um die wirtschaftliche Situation. Schließlich befasst sich die Studie mit methodischen Besonderheiten der Anwendung der CVM in Deutschland, insbesondere in Ostdeutschland, und prüft unter diesem Aspekt auch eine geeignete Ausgestaltung der Zahlungsbereitschaftsfrage, die in der Literatur noch immer umstritten ist.

Abstract:

Large parts of East German landscapes are formed by lignite mining activities. The mining pits destroy vast areas of the existing cultural landscapes. These areas have to be made re-accessible to society through extensive reclamation projects after mining has been finished. For an appraisal of the social benefits that need to be compared to the costs of these projects the Contingent Valuation Method (CVM) is the method of choice. The CVM measures the willingness to pay of households for such a project. This paper reports the findings of a Contingent Valuation study assessing the social utility created by a reclamation project north of the city of Cottbus in Brandenburg, Germany. The goal of the study is threefold. Firstly, the affected population's aggregate willingness to pay for the planned reclamation project is calculated; it amounts to 2.7 mil. Euro per year. Secondly, the determinants of this willingness to pay are analyzed. Apart from the expected positive impact of income on willingness to pay we find that it is also influenced by people's recreational activities, their general attitudes towards public spending and by their concerns about the economic situation. Thirdly, the study explores methodological specifics of an application of the CVM to Germany, especially in East Germany, by focusing on the appropriate design of the willingness to pay question which is an important feature still controversially discussed in the literature.

We are indebted to Wolf Schluchter from the Brandenburg Technical University (BTU) in Cottbus and to Barbara Pfetsch from the University of Hohenheim for lively discussions of the questionnaire. Michael Braun, Rolf Porst and Beatrice Rammstedt from the Center for Survey Research and Methodology (Zentrum für Umfragen, Methoden und Analysen - ZUMA) rendered every possible assistance in the development of the questionnaire. The data of the German Socio-Economic Panel (GSOEP) used in this publication were provided by the Deutsches Institut für Wirtschaftsforschung (DIW), Berlin.

1 Introduction

Lignite was a major fuel in the former German Democratic Republic. This fact resulted in one of the big environmental problems the Federal Republic of Germany inherited from this era. Due to the vicinity of the coal layers to the ground surface lignite is predominantly extracted by open-pit mining. After mining has been abandoned there remain huge areas of devastated landscapes, the total area of all East German reclamation sites is 86,000 hectare and the question of the future use of these areas arises. The least costly possibility is, of course, to leave the exploited landscape as it is, and this is what was mostly done in GDR times when economic means were scarce and resources were needed for other, more pressing purposes. So, until the German reunion vast stretches of former mining terrain, especially in Saxony (near Leipzig and Halle) and in Lusatia (south-east of Berlin), were left devastated. After the reunion reclamation works started at a large scale in these regions and billions of Euro were spent. In times of tight public budgets and increasing economic problems the question arises if public funds should not be used for alternative purposes where they contribute more to the economic welfare of the population. Cost-benefit analysis can help to answer this question.

There are mainly three forms of reclamation of former open-pit mining areas: agricultural use, forestry and the development of recreation areas, mostly with lakes in the former mining pits. Agricultural reclamation is expensive and still leads to low soil quality, especially in Lusatia where soil quality is poor in general. Also, in Germany there is an overproduction in the agricultural sector so that any expansion of this sector is unwanted from a political point of view. Forestry on the other hand is cheap if undemanding and fast-growing trees are used and no extensive groundwork is necessary. In spite of these economic advantages this form of rehabilitation has lost much of its popularity since it leads to rather uniform and monotonous landscapes. The most preferred form of mining land rehabilitation today, especially in the East of Germany, is the creation of lakes in the former coal pits and the design of new recreation areas surrounding them.

While the costs of rehabilitation can be assessed rather straightforwardly, it is very difficult to tell how beneficial these investments are for the population living in the regions concerned. The cost factors of such projects consist mainly of inputs like labor, capital and materials which are traded in markets and which, therefore, can be valued by their market prices. But the social benefits accruing from the reclamation of former mining terrain consist to a great extent of non-market benefits like beauty of landscape, hiking possibilities, lakes for swimming and fishing etc. for which no market prices exist. Therefore, the appraisal of the social benefits accruing from land reclamation implies the valuation of non-market goods which makes the use of special valuation techniques necessary. The most popular of these techniques until today is the Contingent Valuation Method (CVM). In this paper we illustrate the usefulness of the CVM for the economic valuation of land reclamation using the example of a practical study we conducted in Eastern Germany.

This study was carried out within the framework of the Collaborative Research Center 565 "Development and Evaluation of Disturbed Landscapes" (SFB 565) financed by the German

Research Foundation (Deutsche Forschungsgemeinschaft - DFG). With this valuation study the authors pursued three main objectives. First, they wanted to assess the social value of a rehabilitation project in the immediate vicinity of the city of Cottbus, which lies 120 kilometers south-east of Berlin. In a still active lignite pit near Cottbus ("Cottbus Nord") mining activities will end by the year 2015. At this time the mining company will stop pumping off the groundwater so that it will rise to its original level and the former pit is turned into a lake. The embankment of the lake as well as the whole area has to be reinforced so that public security is ensured. Further, it is envisaged to design the edge of the lake to embrace several beaches, partly with artificially created dunes, camping grounds, sports fields and to provide even a small marina. Swimming, fishing, boating, windsurfing will be possible, new forests with hiking trails will be laid out. A part of the lake and its shores will be reserved for natural conservation to provide habitat for endangered species. The whole setting will be completed and can be used by the public from the year 2027 on, so that many people living today will be too old by then to utilize the lake themselves. But, of course, their children and grandchildren as well as future generations in general can enjoy it.

Since this scenario for the future development of the open-pit mining site Cottbus Nord includes use values (utility gained from fishing, swimming etc.) as well as nonuse values (natural conservation, leaving a recreation site for future generations etc.) indirect valuation methods like e. g. the Travel Cost Method cannot be applied here because they are "blind" to non-use values. These techniques can be used only to assess the use values of a project, so that their application here would lead to a systematic undervaluation of the reclamation project. Therefore, the Contingent Valuation Method was used to assess the social benefits accruing from the "Cottbus Lake" reclamation project. It is an interview technique which aims at the elicitation of people's willingness to pay (WTP) for the project under consideration on the one hand and at highlighting their demographic and socio-economic background as well as their attitudes towards several aspects of society and of life as a whole.

This leads us to the second objective of our study: We aimed not only at the elicitation of people's WTP for the rehabilitation of Cottbus Nord but also at the socio-economic and demographic determinants of this WTP. We also wanted to find out if there are certain character traits or certain "types" of people which are correlated with a higher (or lower) than average WTP for land reclamation. Since our questionnaire contained many personal questions aiming at people's attitude towards life, society, government, politics, their economic situation etc. we were also curious if people's answers would show significant differences as compared to other parts of East Germany and in comparison to the west of Germany. Our reference data set for these comparisons was the German Socio-Economic Panel (GSOEP) provided by the Deutsches Institut für Wirtschaftsforschung (DIW) in Berlin.

Last but not least the third objective of our survey was to test the performance of the CVM under the socio-economic conditions of Eastern Germany and to see if certain methodological flaws of this method like e. g. anchoring effects would show there as well. Since the CVM is based on the construction of hypothetical markets people's general attitude towards private good markets and towards market behavior (e. g. their judgment concerning strategic bargaining possibilities) might influence the validity of CVM results.

The paper consists of four sections. This introduction is followed by a section describing the overall design of our study in great detail so that it should be rather straightforward to get a clear picture of what we did. In section 3 we present our results and analyze them in the light of the three objectives of our study explained above. Section 4 contains some concluding remarks.

2 Design of the study

The assessment of environmental projects typically consists of an assessment of the induced social welfare change. It aims at the question if society as a whole is better off after such a project has been realized than before. In order to answer this question, one first has to estimate the changes of individual welfare of all people affected by the environmental change and then to aggregate these individual welfare changes to assess the change in social welfare caused by this project. The individual welfare measure typically used in cost-benefit analysis is the Hicksian Compensating Variation (cf. Hicks (1941)). It is a monetary measure of changes in individual or household utility and can be interpreted as an individual's or a household's willingness to pay (WTP) for an environmental quality improving project. In other words, the Compensating Variation denotes the amount of money a household can give up after the environmental change without being worse off than before. One method of assessing the Compensating Variation for an environmental change is the Contingent Valuation Method (CVM), which is an interview based method where people are asked their WTP for a carefully laid out scenario of the proposed environmental improvement (cf. Carson et al. (2001)). How to elicit meaningful answers on the WTP question is an ongoing debate. The design of the questionnaire, the description of the scenario to be valued and the formulation of the questions are important to obtain sensible results. The task of valuing a non-market good is, generally speaking, a novel situation for the respondents and they have to be carefully led through the interviews. A CVM interview consists of five parts. In the remainder of this section, these parts will be discussed in turn. We will also report findings of several pretest rounds, which helped tailoring the questionnaire to the needs of a sensible valuation of the reclamation project. The results of the main survey will be presented in section 3.

A. Warm-up questions

Due to the already mentioned novelty of the situation for the respondents, a CVM interview cannot start straight away describing the environmental project and asking the valuation question. It has to be initiated by a couple of warm-up questions, to make the respondents feel comfortable with the situation. For a lot of people being interviewed somehow resembles being tested and they feel embarrassed if they have to undergo a task that they are not familiar with. Therefore, it has been suggested to start a CVM interview with a few questions that everybody has an answer to. These questions should not be too personal, lead to the subject of the interview and “break the ice”. In the questionnaire for the valuation of the Cottbus Lake, we started with an overall introduction, describing the goal of the survey and emphasizing the research purpose of the interviews and the anonymity of all answers. The first questions concerned the overall familiarity of the respondents with lignite coal mining and with the open pit at Cottbus Nord. We then turned to questions about how informed the respondents were with respect to the reclamation project to be valued.

It needs a lot of preparatory interviews and pre-testing of preliminary questionnaires to arrive at an interview design that is appropriate to assess people's "true" preferences for an environmental good or project. The first pre-testing wave consisted of 30 in-depth interviews with randomly selected households. The questionnaire for this first wave included many open questions and the interview was taped when the respondents consented. The results helped to develop a first version of the survey questionnaire which was refined in three consecutive waves of pre-testing with about 40 interviews each. The introductory part of the questionnaire continued with questions about recreational activities of the households. The answers could be chosen from a list, which covered a wide range of activities and is largely compatible with the respective questions in the German Socio-Economic Panel (GSOEP) (cf. GSOEP (2003)) to facilitate the comparison of answers with results from the GSOEP. The intention here was to check if there are characteristic differences with respect to these activities between the population of Cottbus and the population of other regions which are recorded by the GSOEP. Further, we wanted to find out if the typical leisure activities of people there are related in some way to the utilization of a future lake. The introductory section closed with questions about who should pay for public goods such as schools, libraries, for parks, swimming pools, discotheques and youth clubs. This last question was intended to identify the attitude towards the state and the provision of certain goods that had been provided publicly under the former regime.

Among other issues, we tried to explore how the Cottbus population was involved in the planning process of the projected reclamation. Our open questions led to rather spirited debates on the coverage of the project in the media, which helped to frame the questions of the final version of the survey. It turned out that a lot of individuals followed the discussion in the media. The level of familiarity and knowledge about the project has been shown to be an important prerequisite for a successful CVM study (Munro and Hanley (2001) or Blomquist and Whitehead (1998)). People, who are not familiar with the good to be valued, tend to misunderstand the project description and look for clues in the suggested scenario.

B. The Scenario

The description of the good to be valued is crucial for the successful interview since people cannot visit the future recreation site and see how they like it. So their valuation depends on the impression they get of the good from the description in the questionnaire. It has to be brief so people do not get bored or lose attention, thus it has to be sufficiently comprehensive for people to really know what they will be getting for their money. We also experimented with different additional visual material. The initial idea was to present a small booklet that the respondents could read in their own time and therefore obtain the necessary information at their own pace. However, from the pretests we refrained from this idea for two reasons. Firstly, respondents felt uncomfortable reading while the interviewer was watching. They either felt too slow and rushed or they felt insufficiently thorough and idled. Secondly, it is rather difficult to compare the amount of information obtained after self-study across respondents without resorting to embarrassing test-type questions. From this experience, we developed a text that was read to the respondent and illustrated with seven displays that contained maps and further visual material.

As one main aspect, legal questions were important to cover in the text, since reclamation has been part of the legal framework surrounding unification in 1990. Of course, the population would not be willing to pay for measures that lie in the responsibility of the mining companies. As a consequence, the scenario had to be very specific on this issue by separating measures paid for by the industry and measures that would have to be paid from the public budget. It turned out that the mining industry is legally responsible mainly for safety issues, i.e. securing the grounds according to German Mining Law, and for monitoring the water quality. These aspects were determined together with expert groups from the mining industry, the municipal government, hydrologists and civil engineers. By the time of the study, the municipal governments in the adjacent communities were still in the decision process concerning the future design of the Cottbus Lake and had just closed a contest which led to several different proposals and designs. Fifteen expert interviews helped with developing a plausible design from the proposals. Figure 1 shows the final suggestion that was used in the main survey.

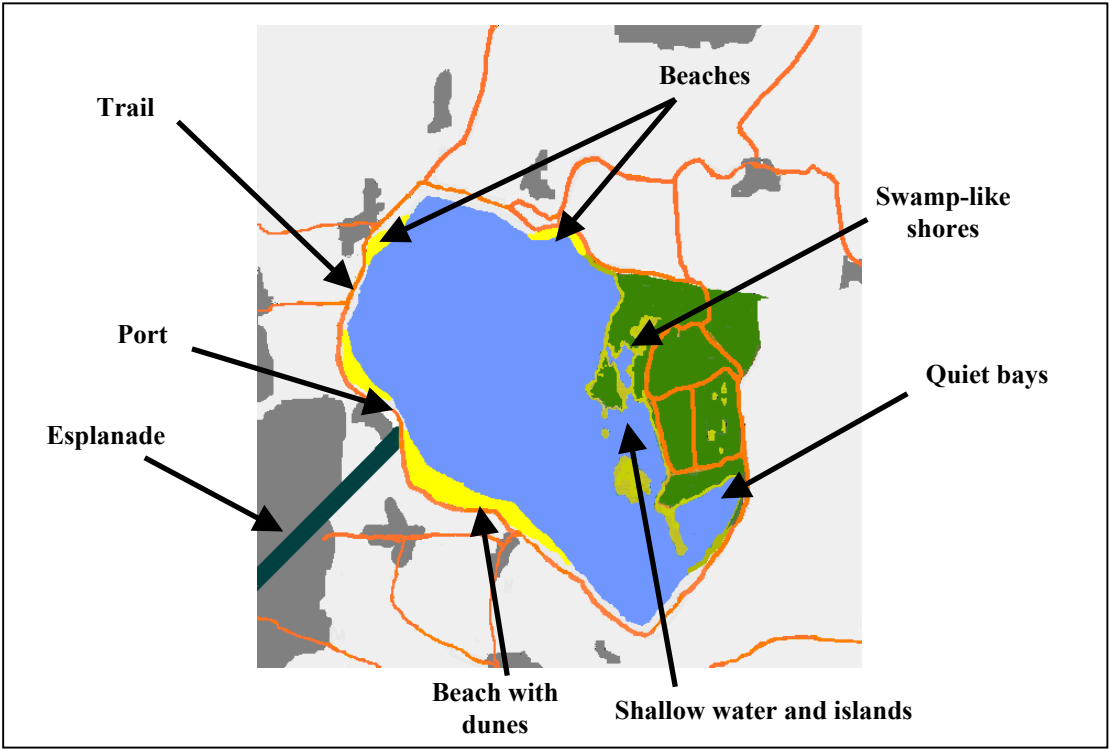


Figure 1: The future Cottbus Lake

The entire area of the current mine covers 2700 hectares of which the lake will take 1900 hectares. Mining will be finished by 2015 and the lake will be open to the public by 2027. The scenario used in the main survey comprises two main elements: a recreational and an environmental element. The part of the lake and surrounding areas designated to recreational use will be entirely accessible to the public. The main features of this element include several beaches, trails that can be used for hiking and biking around the entire lake, a small marina in the eastern part of the lake and an esplanade that connects the city of Cottbus conveniently with the southwestern shore of the lake. Other recreational activities like fishing, camping and beach and water sports were also specified. For the second element of the scenario the eastern

shore of the lake was set aside with only restricted access to the public. This area was meant to function as a nature preserve in which natural woods, small reed bays and shallow waters could form habitats for certain endangered animal species that were once typical for the area.

To test if people understood the description of the scenario and if the scenario appealed at all to the respondents we included a question, where people could express their opinion on certain design features. On average the natural resort was considered as important as the recreational facilities in the pretests, some more exotic features as a beach design with dunes were considered less important.

To elicit people's willingness to pay for this scenario, they not only have to understand what they get if they agree to the payment and the project but also what they forfeit if they reject the project. The alternative scenario in our case is the "as is" solution, where only the legally required measures to guarantee public security will be taken and an accessible but largely unattractive lake will be the result. From the GDR past, respondents were quite familiar with this situation. The next important question now was to construct a market scenario describing how to pay for the good.

C. Explanation of the market mechanism

The third step in the CVM interview is the explanation of the hypothetical market. Because the situation is new to the respondents the payment vehicle on this market has to be explained very carefully. Several suggestions for a plausible payment mechanism can be found in the literature. An entrance fee has been successfully used for the creation of a new natural park (cf. Bjorner et al. (2000)), as well as a rise in the water bill for a water quality improving project (Whittington (2002)). Also an increase in municipal taxes or the levy of a new fee have been suggested in the literature. New taxes and duties, however, bear the risk that people reject the project because they despise the payment vehicle without giving the project due consideration. We therefore tried to define a payment vehicle that is easily understood, unavoidable and does not evocate instantaneous protests as for instance taxes do. Since the respective municipalities will have to pay for the project a certain rise in local taxes will be the consequence. These will result in an overall increase of costs of living, thus we decided this to be a plausible payment vehicle for our study. The choice for the respondent therefore was to agree to the reclamation project and face a certain increase in their cost of living or to do without the project. Measuring the willingness to pay now meant finding out by which amount the costs of living could rise after agreeing to the project and still leaving the respondents as well off as before.

D. The Elicitation Question

After respondents have been informed of the details of the project to be valued and of the hypothetical market mechanism they are asked their WTP for this project. Though the most natural choice at a first glance seems to ask the straightforward question: "By how much could your living expenses rise if the Cottbus Lake will be built without making you feel worse than today?", this question leaves people puzzled, because they are not used to setting the price for their purchase, let alone a for public good. Answers to this type of "open" question have been found prone to biases such as for instance strategic behavior of the respondents

which are exaggerating their willingness to pay to make sure that the good will be provided. These biases lead to systematic errors in the calculation of average willingness to pay. It has been shown in several studies in the literature that the open-ended question format leads people to strategic behavior due to free-riding tendencies and they claim a lower value of the public good. Therefore, Bishop and Heberlein (1991) suggested the so-called referendum format, to model the everyday shopping experience, where a good is presented on the shelf at a certain price and the consumer can purchase it at this price or leave it on the shelf. The willingness to pay question now reads: “If living expenses increased by the amount of x Euro, would you vote for the project?” The respondents in a survey are confronted with randomly assigned different prices, also called “bid levels”, and the result of a survey in the referendum format is a vector of bids and a vector of "yes" and "no" answers to the referendum question. From this type of data we can deduce that the bid is a lower bound to the real willingness to pay, if the respondent agreed to the project and an upper bound if he or she rejected the project. Obviously, this kind of data does include less information on the actual willingness to pay than the direct statements of the respondents’ willingness to pay. We therefore pay for an increasing incentive compatibility in terms of a lower efficiency of our estimates of average willingness to pay. To enhance efficiency and at least get upper and lower bounds of the respondents’ willingness to pay, Haneman (1991) suggested the so-called double bounded referendum format which poses a second question, i.e. a follow-up question, depending on the answer to the first question. If an individual agreed (denied) to pay the suggested price, a higher (lower), price is suggested. This way information about an interval for the individual willingness to pay can be obtained and the range of the possible willingness to pay of an individual is narrowed. Figure 2 illustrates the sequence of questions in the double bounded referendum format.

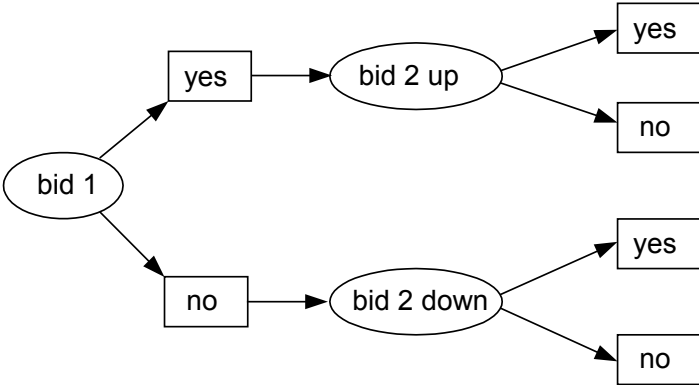


Figure 2: Question sequence of the double bounded referendum format

This theoretically elegant solution has some downfalls in its practical application. Posing a second question can lead to reactions of the interviewed individuals, which are seemingly not compatible with the random utility model underlying the statistical concept for the analysis of dichotomous choice data. According to this model, people base their decisions on the comparison of the utility they experience in the fictitious situation where the project (Cottbus Lake) has been realized and the proposed bid has been paid on the one hand and the actual situation (no lake) on the other. Asking follow-up questions with higher or lower bids in this model only means probing at different prices to get a better idea of the willingness to pay of

the respondent. Thus, in the spirit of the random utility model the answers to this probing are assumed to be independent from each other. If, however, the individual perceives the second question as the attempt of bargaining or haggling, or the attempt to sell a lemon, the answer will not be based on the choice between the suggested alternatives, but on some kind of reaction to this presumed bargaining attempt. Therefore, the answer will be biased by the answer to the first question. A similar suspicion is described e. g. in DeShazo (2002) and called the anchoring effect caused by the double bounded referendum format. It has been shown in several studies, that there exists such a bias. Anchoring effects especially concern the answers after an acceptance of the first bid. If the respondent answers with “no” to the second, higher bid, this can be due to the fact that the first bid is considered a kind of anchor (“it’s a deal!”) and all higher bids will be rejected, even if the true willingness to pay is much higher than the proposed bid. Therefore, anchoring effects lead to an undervaluation of the environmental good. There are several cures to this malady suggested in the literature, which range from a change in question format (and giving up parts of the efficiency gain) to carefully posing the second question and trying to make sure it is understood by some suitable questionnaire design. In the Cottbus project, we tried to implement the latter. Table 1 shows the different bids proposed to the respondents of our study.

Table 1: Versions of the questionnaire

	A	B	C	D
First bid (bid 1)	5	10	15	20
Second bid, down (bid 2 down)	2.5	5	10	15
Second bid, up (bid 2 up)	7.5	15	20	25

The first willingness to pay question reads: “Would you vote for the reclamation project described before if your personal costs of living rose by 5 (10, 15, 20) Euro per month?” If the respondent answered with “yes”, the second question would read: “Would you *also* vote for this project if your personal costs of living rose by 7.5 (15, 20, 25) Euro per month?” whereas if the answer to the first question was “no” the second question would read: “If your costs of living expenses *only* rose by 2.5 (5, 10, 15) Euro per month, would you *then* vote for the reclamation project?” By this choice of wording, we tried to make sure the respondent understands, that the interviewer is not trying to bargain but just probing the willingness to pay at different levels. As a matter of fact, the choice of the payment vehicle “increasing costs of living”, precludes the bargaining suspicion even further, because the interviewer – or for that matter the government – does not have as direct an influence on this payment vehicle as on a tax or fee. In the pretests this was received quite well and the respondents seemed to understand the questions.

E. Additional information

Had we only wanted to reach our first goal of the study and measure the value of the Cottbus Lake we could have stopped right here. From the answers to the willingness to pay question we can estimate the average willingness to pay of the sample and then aggregate it by simply multiplying this average value with the number of households in the region, as suggested above. To come to conclusions about the validity of our results, however, and to make infer-

ences about the determinants of the willingness to pay and some about some specifics of the Cottbus population more information is required.

The next sections will show some results for the Cottbus data including a plausibility test which is rooted in economic theory. From economic theory, we have a set of proper models with well-defined functional forms that agree with the micro-economic foundation of the underlying welfare economic theory. These functional forms for instance call for an increasing willingness to pay when income increases. To test the plausibility of the results we have to measure some socio-economic and demographic variables as well.

Therefore, the questionnaire closes with a section on socio-economic variables. The question to be answered here is twofold: Firstly, what are the expected determinants of people's willingness to pay and how valid is our estimate? Secondly, what are the special determinants of the Cottbus area population's willingness to pay? As mentioned above, one would expect willingness to pay to be positively correlated with the households' available incomes, and from experience we expect that it is also positively correlated with the education level of the household head and negatively with her or his age, particularly for this project, which will be finished more than 20 years from now. Recreational activities and attitudes towards the environment have been found to have explanatory power in earlier studies, too. To check the validity of the study one would test the influence of these variables on the willingness to pay for the expected signs.

Another impact on people's willingness to pay could be expected from their attitude towards the provision of public goods. Coming from a regime with subsidized housing, education, entertainment, health care etc. the Cottbus population might see the creation of the Cottbus Lake in the responsibility of government, too. This attitude might lower their willingness to pay, so the hypothesis. Another element affecting willingness to pay could be the overall satisfaction of people with their standard of living or certain aspects of it like their health, their jobs or the leisure time. The satisfaction of households and their members is also elicited in the German Socio-Economic Panel. Comparing the findings from other parts of Germany with those from our Cottbus survey yields a lot of interesting results.

3 Results

The main survey was conducted by a professional polling institute with ample practical survey experience in the region. The survey was carried out following the random route procedure for respondent selection. For an equal distribution of respondent households within the study region 216 randomly assigned sample points were selected. To avoid selection biases due to varying population density over the study region the sample point selection was based on administrative constituencies ("Wahlkreise") which generally contain similar numbers of households. At each sample point the interviewers chose 8 households following a prespecified selection procedure (random route). 1014 interviews were completed within the six week field phase. Fortunately, the response rate was very high due to a press announcement and a letter of recommendation from the Brandenburg Technical University in Cottbus. Two interviews had to be discarded due to missing answers to the WTP question. The question concerning the respondents' household incomes which is rather crucial for the interpretability

cerning the respondents' household incomes which is rather crucial for the interpretability and plausibility of the results has not been answered in 15 cases.

Information status of the respondents

In the pretests the interviewed households already showed a high level of prior information about project related facts. This finding was confirmed in the main survey. Nearly all respondents had heard about the continuation of open-pit mining of lignite in Lusatia in the future and had even visited a mine themselves. Most respondents stated to have already seen current reclamation areas. With respect to the particular project "Cottbus Lake" the rate of people with general information about the planned lake was very high while, not surprisingly, only about half of the people were more familiar with the details as presented by a contest of ideas held in 2001 (Stadt Cottbus (2002)). Table 2 shows the results in greater detail.

Table 2: Level of prior project related information of the population

Question	Percentage "Yes"
Heard of continuation of open-pit mining in the future?	87 %
Visited open-pit mining?	83 %
Seen reclamation area?	76 %
Heard of the Cottbus Lake?	86 %
Heard of the contest of ideas?	48 %
Visited the contest's exhibition?	13 %
Know people who visited the exhibition?	19 %

Own calculations.

The high level of information of the population with respect to the proposed project suggests that respondents are sufficiently prepared at the outset of the personal interviews to make valid decisions concerning the valuation of the project.

Importance of the elements of the scenario

As can be seen from table 3 the proposed scenario of the Cottbus Lake was well received by the survey respondents who expressed a considerable interest in the various elements of the proposed design of the lake. The design comprises two major elements, the recreational element and the environmental element. The data show a highly significant correlation among the various features of the two main elements.

Thus, it can be deduced that respondents were in general equally interested in both elements of the proposed design, no distinct groups of people primarily interested in the recreational element or the environmental element could be detected. From these data we conclude that the proposed scenario was well-designed and understandable. Also, it appeared to be relevant to the respondents so that they should be sufficiently motivated to put some effort into responding thoroughly to the questions.

Table 3: Importance of selected design features

Element	Mean*
Beaches	5.29
Dunes	4.87
Camping and barbecuing	4.37
Possibilities for water sports	4.47
Marina with boat rental	4.53
Possibilities for hiking and cycling	5.48
Nature reserve, habitat for plants and animals	5.74

Own calculations.

*) The respondents gave their answers on a 7-point Likert scale in which 1 denotes “not important at all” and 7 denotes “very important”. In the table the sample means are reported for each feature.

The elicitation question – results

Estimation of average household and aggregate WTP for the proposed reclamation project

To obtain the empirical goal of the study, the estimation of the value of the Cottbus Lake, we have to set up an appropriate statistical model for this estimation. From the double bounded referendum format we get a "yes" or "no" answer from each respondent to each question. Therefore, each respondent results in one of four possible combinations of the yes/no answers (see figure 2). Table 4 shows the frequencies of each combination sorted by questionnaire version. As expected, the frequency of the no/no combination increases with increasing bids while the frequency of the yes/yes combination decreases.

Table 4: Frequencies of the answers

Version		no/no	no/yes	yes/no	yes/yes	total
A	WTP interval	0 – 2.5	2.5 - 5	5 – 7.5	7.5 - ∞	253 respond.
	frequency	47.4 %	10.3 %	21.3 %	21 %	100 %
B	WTP interval	0 - 5	5 -10	10 –15	15 - ∞	249 respond.
	frequency	50.8 %	16.4 %	20.4 %	12.4 %	100 %
C	WTP interval	0 - 10	10 -15	15 –20	20 - ∞	255 respond.
	frequency	65.9 %	9.4 %	12.2 %	12.5 %	100 %
D	WTP interval	0 - 15	15 - 20	20 - 25	25 - ∞	255 respond.
	frequency	75.3 %	5.9 %	9.4 %	9.4 %	100 %
Total		606 respond. 59.9 %	106 respond. 10.5 %	160 respond. 15.8 %	140 respond. 13.8 %	1012 respond. 100 %

Own calculations.

Therefore, from the survey we obtain information necessary to estimate the true WTP of the respondents in the intervals given in table 4. Based on a logit model, we estimate an average household willingness to pay for the Cottbus Lake of 4.39 Euro/month. Confidence intervals can be obtained by the bootstrap method (cf. Park et al. (1991), Cooper (1994), Krinsky and Robb (1986)). A 95 % confidence interval based on the bid amount as only explanatory variable results in 3.45 to 5.23 Euro per month. A model that includes more explanatory variables will be presented below.

Apart from the discrete data shown in table 4, continuous WTP amounts were obtained by an open-ended elicitation question following the two binary responses of the closed-ended question. In this open-ended question most respondents strictly stuck to the lower limits obtained from their answers to the closed-ended questions. Thus, for example most no/no respondents stated a zero WTP (“true zeros”) while most yes/no respondents reported the amount of the first bid also as their maximum WTP. Only about 20 % of the respondents stated maximum WTP amounts that were above these lower limits of their respective intervals, a few even as high as 100 Euro/month. The arithmetic mean computed from the open-ended data is 5.71 Euro/month which is significantly higher than the one computed from the discrete data. Thus, it becomes obvious that the open-ended follow-up question can change the closed-ended result quite substantially, but problematic biasing effects described in section 2 cannot be precluded.

Table 5: Average household WTP and aggregate WTP for the “Cottbus Lake”

	closed-ended data	open-ended data
Avg. household WTP	4.39 Euro/month	5.71 Euro/month
Aggregate WTP	2.68 mil. Euro/year	3.49 mil. Euro/year

Own calculations.

The city of Cottbus and the surrounding communities have roughly 100 000 people that live in 50 899 households. Using the estimates derived from the closed-ended data yields an aggregate willingness to pay for the population affected by the proposed design of the Cottbus Lake of ca. 223 000 Euro/month or 2.68 mil. Euro/year. The payment vehicle “increasing cost of living” assumes that this amount will be paid “forever”. Almost 2.7 mil. Euro per year will therefore be an estimate of the benefits created by the suggested design of the Cottbus Lake each year. Using the mean computed from the open-ended data yields an aggregate value of 290 600 Euro/month or 3.49 mil. Euro/year.

Anchoring effects

As described in section 2 one of the aims of the study was to avoid anchoring effects in the use of the double bounded referendum format. As explained in the previous section this was to be achieved by employing a suitable payment vehicle on the one hand and by a subtle formulation of the follow-up question so that the respondent does not get the notion of entering into a bargaining situation with the interviewer.

However, the data shown in table 4 indicate that anchoring effects occurred even with this question formulation designed to avoid such effects. Since the different versions of the questionnaire were distributed randomly among the population each subsample pertaining to a questionnaire version should have the same expected WTP distribution. Consequently, equal acceptance and rejection rates are expected for the same bid intervals regardless of the questionnaire version presented to the respondent. For example, the yes/no answers starting from a 10 Euro bid yield a willingness to pay that is at least 10 Euro but smaller than 15 Euro. The same willingness to pay can be deduced for a no/yes answer starting from an initial value of 15 Euro. However, in our data we find for the latter case a frequency of 9.4 % and for the

former case a frequency more than twice as high (20.4 %). Expressed in numbers of respondents, one could say that in the [10, 15] interval 27 individuals “fell victim” to the anchoring effect. Similar results are obtained for the [15, 20] interval in which 16 people showed anchoring response behavior. These people could have a higher “true” willingness to pay but failed to respond truthfully because they experienced the second question as a bargaining attempt of the interviewer.

Unfortunately, it is difficult to imagine an ex-post cure for observed anchoring effects since such an effort would involve to reclassify certain respondents with a yes/no response to the yes/yes response group. However, on which grounds should one not trust a respondent’s answer and assume that he or she was really having a different valuation in mind? We feel that such a reclassification cannot be undertaken on objective grounds and, therefore, necessarily introduces subjectivity into the analysis. It has to be acknowledged that the double-bounded referendum format, however economically intuitive and empirically practical it might be, is prone to the described anchoring effects and necessarily produces biased estimates of willingness to pay. Thus, this analysis leads to the recommendation that the double-bounded format should be abandoned and other elicitation formats should be employed instead. While the single-bounded format is clearly incentive compatible from a theoretical point of view, other formats like e. g. the payment card method might be more practical due to smaller required sample sizes.

Additional information - results

Representativity

Checking the representativity of a survey always has to be the first step of any data analysis. Comparing the results of the survey with official statistics shows that the differences between the Brandenburg data and the Cottbus sample are sufficiently small to call our study representative for the households affected by the planned project.

A rather surprising result is found, if we compare the average satisfaction levels of our sample with those from the corresponding questions in the German Socio-Economic Panel. Table 6 gives the results for West Germany, East Germany and our sample. Intuitively one would expect that people in East Germany are less happy with their standards of living and their incomes because these are on average much lower than in West Germany. The data confirm this intuition. However, the findings in the Cottbus sample are surprising. The inhabitants of Cottbus seem to be much happier than the average of the East German population and sometimes exhibit even a greater level of satisfaction than people in West Germany.

Table 6: Levels of satisfaction*

	West	East	Sample
Health	4.128	4.065	4.966
Job	2.129	2.005	4.084
Household income	4.014	3.385	4.031
Housing	4.905	4.719	5.464
Leisure	4.466	4.206	5.021
General standard of living	4.490	4.074	4.637

GSOEP 2003, own calculations.

*) The respondents in our sample gave their answers on a 7-point Likert scale in which 1 denotes “not satisfied at all” and 7 denotes “very satisfied”. The GSOEP data originally measured on a 11-point scale were transformed into a 7-point scale.

However, the statement “People will take advantage of me.” was confirmed by as many inhabitants of Cottbus as East Germans in total. At least on the issue of fearing to be exploited they seem to act typically for their region.

Protest responses

Although most respondents expressed to consider the proposed features of the lake as important the number of respondents who stated a willingness to pay of zero was very high. 49 % of the respondents were found to reply “zero” to the open-ended question after answering no/no to the referendum question. The responses to the question concerning the reasons for stating a zero WTP are diverse, as can be observed from table 7. While most such respondents state that they cannot afford additional expenses, the rate of respondents who also reject an increase in local fees and taxes and who see the responsibility for financing this project with the government or the mining company is very high. Therefore, it is hypothesized that a number of respondents stating “zero” would actually benefit from the proposed design of the lake and have a positive valuation for the project but due to the mentioned aversions refuse to state a positive amount in the interview.

Table 7: Selected reasons for “true zeros”

Reason	Mean*
An increase of local fees and taxes is not acceptable.	6.56
I cannot afford any additional expenses.	6.10
Such projects should be financed by government.	6.04
The mining company is morally responsible.	6.42
There are already enough lakes in the region.	3.60
20 years is too long from now.	5.36

Own calculations.

*) The respondents gave their answers on a 7-point Likert scale in which 1 denotes “does not apply at all” and 7 denotes “fully applies”. In the table the sample means are reported for each reason.

On the basis of the stated reasons for not paying and the importance of the design elements it was tried to identify clear protest responses. Those respondents who exhibited a high importance of the design elements and showed a high aversion against the proposed financing mechanism were classified as protesters and subsequently excluded from the sample. 32 re-

spondents fulfilled these criteria, i.e. about 6 % of the “zero” respondents. Taking account of protest responses leads to slight increases of the estimates for average household willingness to pay. The closed-ended WTP increases to 4.78 Euro/month while the open-ended WTP increases to 5.88 Euro/month.

Determinants of willingness to pay for the Cottbus Lake

The second empirical aim of the study was the assessment of the population’s determinants of willingness to pay for the Cottbus Lake. On the one hand these determinants serve as a plausibility test of the data since there exist prior expectations on theoretical grounds and from numerous empirical studies as to the influence of socio-economic and attitudinal variables on willingness to pay. From economic theory we do expect willingness to pay to increase with income. From the literature we also expect willingness to pay to decrease with age and to increase with education level. All these prior beliefs were confirmed (cf. table 9). On the other hand one expects to gain insights into the valuation process in the specific context of Eastern Germany. The interesting question in this context is: Who are the people who have a high willingness to pay for these benefits and what determines it?

For these goals it is necessary to include into the model further covariates, i.e. explanatory variables that were part of the questionnaire. For the selection of these variables, however, we were confronted with a decision problem, since the questionnaire contains a total of 39 questions, several of these with up to 22 sub-questions. To reduce the model’s degrees of freedom and avoid highly collinear variables we used factor analysis for the more complex questions (leisure activities, attitude towards society, elements of the lake design, and memberships in organizations). The expected values of willingness to pay from the full logit models are a little lower than from the models cited above (3.89 Euro/month for model including the protesters, 4.27 Euro/month excluding protesters). The likelihood values show that the complex models perform a little better than the simple models that only contain the bid as explanatory variable.

In addition to the logit model we also report the results from the open-ended data which were analyzed using a Tobit¹ model using the same explanatory variables. Table 9 reports the coefficients of the logit model and the marginal effects of the Tobit model, both with their respective statistical levels of significance. From the comparison of the results of the two models it can be seen that by far most variables affect willingness to pay into the same direction. Also, the levels of significance are similar in most cases, except for e. g. household size, sports and cultural activities. From table 9 we can deduce the following interpretation: With respect to the plausibility of the data it can be observed that the prior expectations regarding socio-economic characteristics are largely met. Increasing the bid in the closed-ended elicitation format increases the probability of a negative answer (rejection of the offer). This corresponds to the everyday experience with market goods. Moreover, willingness to pay increases with increasing household income, it decreases with increasing household size and increasing concern about the household’s own economic situation. It seems plausible that disposable income per household decreases with household size and that economic concerns lower the willingness to decide in favor of additional expenses.

¹ Halstead et al. (1991) also use the Tobit model in open-ended data estimation.

Table 8: Models with covariates

	Logit model		Tobit model	
	Coefficient	p-value	Marginal effect	p-value
Directly asked questions:				
Age	-13.85	0.028	-0.046	0.011
Monthly income	0.47	0.000	0.0012	0.000
Education level	51.66	0.195	153.00	0.204
Household size	-206.98	0.025	-0.173	0.520
Distance to the lake (in travel time classes)	-223.12	0.006	-0.759	0.005
Gender (1=female, 0=male)	353.39	0.041	0.893	0.082
Environmental attitude (2 significant prompted statements)				
Environmental measures should be pursued, even if jobs are lost in the process.	105.01	0.014	0.282	0.033
National parks and protected areas should be at least in parts not accessible for people.	105.21	0.029	0.491	0.001
Willingness to make sacrifices for the environment				
Would you be willing..... ... to pay higher prices for environmentally safe products?	-477.42	0.003	1.695	0.001
Concerns				
Concerned about the own economic situation	-174.81	0.000	-0.588	0.000
Feeling of exploitation				
Others will exploit me if given the chance	-365.89	0.022	-0.894	0.061
Leisure (6 factors extracted from 22 answers)				
Sports	149.94	0.037	280.91	0.176
Cultural activities	121.03	0.084	194.61	0.362
Home and garden	270.88	0.000	579.10	0.006
Relaxing	147.96	0.014	442.45	0.022
Car and motorcycle	-174.99	0.003	-482.05	0.009
Social and religious activities	-18.46	0.741	58.45	0.743
Influence of the state				
Amount of publicly financed goods	-178.11	0.012	-263.81	0.227
Design elements of the lake (4 factors extracted from 13 questions)				
Recreation in the water	230.15	0.003	754.99	0.001
Recreation around the lake and environmental protection	454.96	0.000	1255.43	0.000
Infrastructure and gastronomy	281.69	0.000	826.15	0.000
Particular wishes	394.45	0.000	1141.90	0.000
Memberships (3 factors extracted from 8 questions)				
Societal groups	66.64	0.132	325.03	0.027
Environmental groups	40.32	0.231	137.59	0.224
Religious groups	74.13	0.033	269.70	0.010
Other variables				
Constant	1.47	0.029	1.012	0.520
Bid	-181.97	0.000	-	-
With p-values smaller than 0.05 the covariate is significant on the 5% level, smaller than 0.1 significant on the 10% level, respectively.				
Own calculations				

The marginal effect of monthly household income on WTP computed from the Tobit model, however, indicates that this influence is very small: an average increase of income by 100 Euro would only lead to an increase of average WTP of 12 cents. From empirical studies it is well known that women tend to have a higher willingness to pay than men. However, this result is surprising in this study since respondents were asked their entire household's willingness to pay and not just their own personal one. Probably, a woman's good heart also influences household spending! Thus, the observed influences of the socio-economic variables indicate the validity of our data.

Moreover, observed WTP is related to the specific project in a rather expected way. The relation between the stated importance of the design elements of the lake as expressed by the four factors in table 8 and WTP is significantly positive. Obviously, the suggested scenario was chosen in accordance with people's preferences. Also, willingness to pay falls with increasing distance to the lake measured by travel time. This result seems plausible since the attractiveness of substitutes increases with increasing travel time to the lake.

As expected a preference for sports and recreational activities in the leisure time increases the WTP for the Cottbus Lake while a preference for occupying oneself with cars and motorcycles during the leisure time lowers it. It is obvious that the lake is not very attractive for these kinds of activities. However, the plausibility of the other factors pertaining to leisure activities is not so obvious. It is surprising, for example, that people who engage in home and garden activities, also attach a high value to the Cottbus Lake. One would assume that a focus on the own home or the own small garden parcel outside the city might let the lake seem less attractive. However, it is conceivable that the proposed lake appears as a welcome change and as an enrichment in alternative leisure possibilities in nature for this group of respondents. Similar reasoning might apply to the observed positive impact on WTP of the factors "cultural activities" and "relaxing" which are not directly related to specific activities brought about by the proposed lake.

Also, in the field of personal attitudes the prior expectations were mostly confirmed. Members in religious or other organizations have a higher than average WTP. Maybe these individuals are generally more willing to contribute actively to the well-being of other people. On the other hand, people who support a strong governmental financial responsibility for the provision of public goods obviously do not want to contribute much to the Cottbus Lake. In relation to environmental attitudes it could be observed that the more environmentally concerned someone is, the more money she or he is willing to pay.

Finally, one aspect worth mentioning is the observed statistically significant negative relationship between people's fear of being exploited by others in everyday life on the one hand and WTP on the other since from a theoretical point of view this feeling should have no connection to the project to be valued. From the GSOEP data one finds that people in East Germany have significantly less trust in others and a higher fear of being exploited by others than people in Western Germany. These feelings of distrust and exploitation might lead to a lower tendency to pay for a commodity from which other people can also benefit like the proposed lake.

Characterization of response groups

Finally, in the context of the double-bounded referendum format we were interested in the correlations between the four possible response groups and their socio-economic and attitudinal characteristics. We hypothesize that the response groups are distinguishable by socio-economic and attitudinal variables so that people who belong to a certain response group have generally certain characteristics in common. For the four response groups we found a clear, i. e. statistically significant distinction between the yes/yes-group and the no/no-group. The yes/yes-group is generally younger, richer and better educated and lives in larger households. Its members are more satisfied and less concerned about their own economic situation. They are more active in their leisure time and more green in their environmental attitudes. They consider the recreational part of the design of the Cottbus Lake as very important. The no/no-group is distinctly different: its members are generally poorer, less educated and older than all the other groups. The observed distinctions between the remaining groups were not as pronounced as between the two extreme response groups so that no clear characterization was possible in these cases.

4 Concluding remarks

Regarding the three objectives of our study as mentioned in the introduction we obtained the following results. First, we found out that people's WTP for the Cottbus Lake seems to be rather low in the region where the potential users of this lake live and where the awareness of this environmental project should be expected to be highest. Nearly half of the people interviewed stated a WTP of zero which is, indeed, surprising. Nevertheless, with an average WTP of 4.39 Euro per month and household, overall ("social") WTP per year still reaches a level of nearly 2.7 mill. Euro. This does not seem to be too bad if we consider that these payments are not defined for a finite time horizon, i. e. people are willing to pay this annual amount "forever".

Concerning our second goal, the detection of the socio-economic and demographic determinants of people's WTP, it turned out that a high household income, being young and leading a socially active and sportive life as well as having a high standard of environmental awareness have a positive influence on WTP. On the other hand, personal financial troubles, a low level of education and the need to feed a big family tend to lower a household's WTP for the rehabilitation of the Cottbus Nord mining pit. The personal attitude towards the extent of government's responsibility for the well-being of people also turned out to have significant influence on individual WTP for a public project like land reclamation. People who are convinced that government is responsible for all and everything naturally do not accept the idea that private citizens should contribute to the provision of a public good. Our results reflect this relation between people's attitudes towards government responsibility and their WTP for the Cottbus rehabilitation project quite clearly. In general, the relationships we found between demographic and attitudinal characteristics of households on the one hand and their stated WTP on the other are plausible and in accordance with economic theory, so that they may serve as an indication for the validity of our survey.

The third objective of our study was to check if certain methodological problems of the CVM would also show in Eastern Germany where people have much less experience with a market economy and the strategic aspects of market behavior. Here we found that in the socio-economic context of Eastern Germany the same procedural problems arise as elsewhere. Especially, we observed the occurrence of anchor effects in the context of the double-bounded referendum question format we used in our study. It turned out that the answer to the follow-up question for the elicitation of the interviewees' WTP was not independent of their answer to the first question. This finding, which is in accordance with the results of other studies (cf. DeShazo (2002)), calls into question the usefulness of the double-bounded referendum format which has been praised for such a long time in the literature. After our Cottbus experience we are not really convinced of this elicitation format any more and think about other formats.

Last but not least an interesting result we obtained from the comparison of our study to the GSOEP should be mentioned. It showed that our respondents, i. e. the population of Cottbus, appears to be much happier in general and more contented with life than the average of the Eastern German population. This fits quite well into the picture we got of the people living there.

5 References

- Bishop, R. C. and Heberlein, T. A., 1979: Measuring Values of Extra-Market Goods: Are Indirect Measures Biased? *American Journal of Agricultural Economics*, 61, 926-930.
- Bjørner, T. B., Russell, C. S., Dubgaard, A., Damgaard, C. and Anderson, L. M., 2000: Public and Private Preference for Environmental Quality in Denmark, SOM publikation 39, AKF Forlaget.
- Blomquist, G. C. and Whitehead, J. C., 1998: Resource Quality Information and Validity of Willingness to Pay in Contingent Valuation. *Resource and Energy Economics* 20, 179-196.
- Carson, R. T., Flores, N. E. and Meade, N. F. 2001: Contingent Valuation: Controversies and Evidence. *Environmental and Resource Economics* 19, 173-210.
- Cooper, J., 1994: A Comparison of Approaches to Calculating Confidence Intervals for Benefit Measures from Dichotomous Choice Contingent Valuation Surveys, *Land Economics*, 70(1), 111-122.
- DeShazo, J.R., 2002: Designing Transactions without Framing Effects in Iterative Question Formats. *Journal of Environmental Economics and Management* 43, 360-385.
- Halstead, J. M., Lindsay, B. E. and Brown, C. M., 1991: Use of the Tobit Model in Contingent Valuation: Experimental Evidence from the Pemigewasset Wilderness Area. *Journal of Environmental Management* 33, 79-89.
- Hanemann, W. M., 1991: Willingness to Pay and Willingness to Accept: How Much Can They Differ? *American Economic Review*, 81, 635-647.
- Hicks, J. R., 1941: Consumer's Surplus and Index Numbers. *Review of Economic Studies* 9, 126-137.
- Krinsky, I. and Robb, A., 1986: On Approximating the Statistical Properties of Elasticities. *Review of Economics and Statistics* 68: 715-719.

- Munro, A. and Hanley, N.D., 2001: Information, Uncertainty & Contingent Valuation. In: Bateman, I.J. and Willis, K.G. (eds.): Valuing Environmental Preferences, Oxford University Press, 258-279.
- Park, T., Loomis, J. B. and Creel, M., 1991: Confidence Intervals for Evaluating Benefits Estimates from Dichotomous Choice Contingent Valuation Studies, Land Economics, 67(1), 64-73,
- SOEP 2003, Desktop Companion to the German Socio-Economic Panel Study (SOEP), In John P. Haisken-DeNew and Joachim R. Frick (eds.), DIW Berlin, Version 7.0 - September 2003, Updated to Wave 19 (S).
- Stadt Cottbus, 2002: Cottbuser Ostsee – Eine Vision nimmt Gestalt an, Dokumentation des Wettbewerbs Cottbus-Ostsee mit Blick in die Zukunft.
- Whittington, D., 2002: Improving the Performance of Contingent Valuation Studies in Developing Countries. Environmental and Resource Economics 22, 332-367.