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Mark A. Andor, Manuel Frondel, and Marco Horvath[1]

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Abstract

Based on hypothetical responses originating from a large-scale survey among about 6,000 German households, this study investigates the discrepancy in willingness-to-pay (WTP) estimates for green electricity across single-binary-choice and open-ended valuation formats. Recognizing that respondents self-select into two groups distinguished by their belief in their answers' consequences for policy making, we employ a switching regression model that accounts for the potential endogeneity of respondents' belief in consequences and, hence, biases from sample selectivity. Contrasting with the received literature, we find WTP bids that tend to be higher among those respondents who obtained questions in the open-ended format, rather than single-binary-choice questions. This difference substantially shrinks, however, when focusing on individuals who perceive the survey as politically consequential.

JEL-Code: D03, D12, Q48, Q50, H41

Keywords: Elicitation format; contingent valuation; consequentialism

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1 Introduction

In the absence of empirical evidence on revealed preferences, researchers widely employ stated-preference (SP) methods to elicit the value of non-market goods on the basis of hypothetical choices. Although SP methods are favored on theoretical grounds, their external validity remains the subject of much debate (Vossler and Watson, 2013). In particular, there is ample empirical evidence that SP studies may suffer from hypothetical bias. This bias has been documented extensively in the literature – see e. g. Bishop and Heberlein (1979), as well as the reviews by Harrison (2006), and Harrison and Rutström (2008).

To remove or, at least, reduce this bias, various techniques have been proposed, among which is the cheap-talk protocol introduced by Cummings and Taylor (1999), and the certainty approach conceived by Johannesson et al. (1998). Furthermore, recent theoretical and empirical work on SP methods has demonstrated the importance of "consequentiality" for incentive compatibility, that is, the incentive to truthfully reveal preferences. While it is argued that for incentive compatibility, it is essential that an individual perceives an action as consequential (Carson and Groves, 2007; Carson et al., 2014; Vossler et al., 2012), Vossler and Watson (2013) compare SP responses with the revealed preferences of a parallel public referendum, demonstrating that the hypothetical bias in contingent valuation (CV) can be eliminated by focusing on those respondents who perceive their answer as consequential for policy making. The evidence on this issue is further corroborated by numerous empirical studies that investigate the impact of the belief in consequentiality on individuals' WTP, finding a positive relationship (Hwang et al., 2014; Morgan et al., 2018; Zawojska et al., 2019). Moreover, theoretical conditions under which SP methods yield valid estimates of the true preferences are proposed by Vossler and Holladay (2018) and Zawojska and Czajkowski (2017).[1]

[1] While Vossler and Holladay (2018) theoretically derive conditions to ensure incentive compatibility in the open-ended format, their study was not published at the time our survey took place, so that we were unable to employ these conditions in our survey design.

This article adds to the growing literature on the role of consequentiality in SP studies by exploiting that respondents endogenously divide themselves into two groups distinguished by their belief in the consequentiality of their answers for policy making. Based on hypothetical responses originating from a large-scale survey among more than 6,000 German households, we investigate the discrepancy in WTP bids for green electricity across single-binary-choice (SBC) and open-ended (OE) valuation formats.[2] In addition, recognizing that consequentiality status and WTP might be jointly influenced by unobservable factors, we employ a switching regression model that accounts for the potential endogeneity of respondents' belief in consequences (see for example Groothuis et al., 2017 and Herriges et al., 2010) and, hence, biases from sample selectivity.

Single-binary-choice (SBC) and open-ended (OE) formats are among the most common methods to elicit WTP values in CV studies – see Ami et al. (2011), Andor et al. (2017b) and Gyrd-Hansen et al. (2014) for recent studies employing OE methods and Jobstvogt et al. (2014), Veronesi et al. (2014), as well as Whitehead and Cherry (2007) for analyses based on the SBC format. A major advantage of the OE format, which asks respondents for their maximum WTP for the good under scrutiny, is that the resulting responses are not censored and, hence, provide more information than those of the SBC format (Halvorsen and Sœlensminde, 1998). In fact, SBC methods may perform poorly if respondents' maximum WTP is much higher than the maximum amount included in the SBC experiment (van der Pol et al., 2008).

Yet, a key advantage of the SBC valuation method relative to the OE format is that, under certain conditions, it alleviates incentives for respondents to strategically over- or understate their WTP (Arrow et al., 1993). Indeed, according to Carson and Groves (2007), two conditions must hold for SBC formats to be incentive compatible in case of a standard public good. First, the government is able to provide the public good and can compel everyone to pay for it. Second, just one, rather than two or more public

[2]Green electricity is a prime example of an impure public good: it is both a private and an environmental public good given that nobody can be excluded from the associated benefits for which there is no rivalry (see e. g. Kotchen, 2006; Menges et al., 2005, p. 432).

goods, is considered.[3] In addition, for an impure public good, such as green electricity, a third condition must hold, implying that only potential users are interviewed. It bears noting that these three conditions are fulfilled for our empirical example of the WTP for green electricity, given that all households are obliged to pay the surcharge for the promotion of green electricity.

The empirical results received from experiments indicate large differences in WTP estimates across SBC and OE formats (Seller et al., 1985; Kealy and Turner, 1993; Brown et al., 1996; Halvorsen and Sœlensminde, 1998; Balistreri et al., 2001; Poe et al., 2002). Yet, as these studies do not account for consequentiality, it remains an open question of whether this difference would maintain when focusing on those respondents who perceive the WTP question as consequential. Addressing this issue is a key contribution of the present analysis.

Our comparison of the SBC and OE formats is based on the elicitation of households' WTP for green electricity, a topic of high interest (Ethier et al., 2000; Rose et al., 2002) given that Germany has substantially increased its green electricity production since the outset of the millennium, thereby incurring annual promotion costs that exceeded 25 billion euros in 2017 (Andor et al., 2017a). As it is most likely that promotion cost will further increase in the near future, the question arises as to the public's continued support of promoting green electricity.

Among our main results is the finding of a WTP for green electricity that tends to be higher among those respondents who received questions in the OE format, rather than SBC questions. This outcome strongly contrasts with the literature (see Brown et al., 1996, for an overview): The majority of empirical analyses finds WTP estimates that are higher for the SBC, rather than the OE format (e.g. Kealy and Turner, 1993; Halvorsen and Sœlensminde, 1998). The difference across both elicitation formats substantially decreases, however, when we focus on individuals who perceive the survey

[3] As Gibbard (1973) and Satterthwaite (1975) show that formats with more than two response options cannot be incentive compatible unless additional restrictions are placed on peoples' preferences, Carson and Groves (2007) recommend using binary choice questions.

as politically consequential.

The following section provides a summary of the data and the survey design. Section 3 presents descriptive results on the empirical comparison of the SBC and OE formats. Section 4 explains the estimation methods applied, followed by the presentation of our empirical results in Section 5. The last section summarizes and concludes.

2 Experimental Design and Data

The survey underlying this research was conducted in 2015 in collaboration with the survey institute *forsa*, which maintains a panel of more than 10,000 households that is representative for the German speaking population aged 14 and above. (Information on the panel is available at `http://www.forsa.com/`.) *forsa* collects data using a state-of-the-art tool that allows panelists to fill out the questionnaire using either a television or the internet. Respondents – in our survey the household heads – retrieve and return questionnaires from home and can interrupt and continue the survey at any time. A large set of socio-economic and demographic background information on all household members is available from *forsa*'s household selection procedure and updated regularly.

The questionnaire was developed and tested in conjunction with experts in experimental economics. In addition, in several iterations, the questionnaire was improved together with survey professionals from *forsa*. A pretest including 139 households served to prepare the survey and indicated that respondents well understood both the questionnaire and the experimental setting. At the end of the pretest, respondents were asked whether they encountered problems or ambiguities in the survey. None of them mentioned any problem. Likewise, the analysis of the pretest data indicated no anomalies. On this account, we started the survey on the full sample immediately after the pretest.

Given that 6,389 of the 8,711 household heads who were invited to participate

in the survey completed the questionnaire between March 3 and April 29, 2015, the response rate amounts to about 73%. This quota is in line with the response rates resulting from the German Residential Energy Consumption Survey (GRECS), a survey on the annual electricity consumption of about 8,500 private households that was established in 2005 by RWI and forsa (2005), with various waves covering the years 2003 to 2013 (RWI and forsa, 2015).

Panelists were randomly divided into two almost equally large subgroups whose subjects obtained a question on their WTP for green electricity in either the OE or SBC format. Panelists were further randomly divided into two other groups, one of which is confronted with the consequential script reported below. This yields eight (= 2 $\times$ [1 OE format + 3 SBC formats]) subgroups altogether and a split-sample survey design as presented in Table 1, where the number and shares of individuals in each subgroup are reported. This survey design, notably the number of subgroubs, as well as the number of observations per subgroup, resulted from a thorough power analysis.

Table 1: **Experimental Design: Number of Observations in Experimental Groups**

		Consequential Script			
		No	Yes	Total	Shares
Single-Binary-Choice Format:	1 Cent	552	534	1,086	33.8%
	2 Cents	525	537	1,062	33.1%
	4 Cents	528	536	1,064	33.1%
	Total	1,605	1,607	3,212	52.7%
Open-Ended Format:		1,401	1,479	2,880	47.3%
	Total	3,006	3,086	6,092	100.0%
	Shares	49.3%	50.7%	100.0%	–

Prior to the elicitation of the WTP values, all panelists received a brief introductory text that indicated the share of 28% of renewable energy in Germany's electricity consumption in 2014, as well as the government's target of a renewable share of 35% by 2020. The text further informed about the surcharge level of 6.17 cents per kilowatt hour (kWh) for the support of green electricity in 2015, the so-called EEG Levy, and

about the household-size-specific implications for a household's annual electricity cost burden. For instance, a four-person household obtained the information that the EEG levy induces annual cost of 296 euros for a typical household of this size.

Subsequently, subjects of the OE treatment group were confronted with the following question: "In order to reach the target of 35% renewable energy in the electricity mix in Germany, what is the maximum increase in the surcharge (in cents per kilowatt hour) that you would be willing to pay?". While this OE question allows for unlimited WTP bids, the following SBC question gauges the willingness to incur either of three randomly pre-determined increases of 1, 2, or 4 eurocents in the surcharge for the promotion of renewable energy technologies. In detail, the translation of the SBC question reads: "Would you be willing to pay an additional X cents on the per-kilowatt-hour surcharge in order to reach the target of 35% renewable energy in the electricity mix by 2020?", where X is randomly replaced with either a 1, 2, or 4.

Given the increase of nearly 4 cents in the surcharge between 2010 and 2015, and anticipating similar future increases owing to the continued expansion of renewable capacities, the range of 1 to 4 cents seemed to be a reasonable approximation of the cost increases that households were likely to face until 2020. Deliberately, we have refrained from including more than three pre-determined increases in the surcharge, as this would have reduced the number of observations in each treatment group and, thus, estimation precision. This would have undermined a key aim of this study, the profound comparison of SBC and OE estimates.

As a result of our randomized experimental design, we end up with three subgroups for the SBC format that are of almost equal size (Table 1). In the end, randomization was successful, as can be seen from Table A1 of the appendix: A casual inspection indicates that the means of the control variables hardly differ substantially across subgroups. With shares of 49,3% to 50,7% (Table 1), it is also an outcome of successful randomization that virtually half of all respondents received a consequential script, an ex-ante corrective frequently used to reduce hypothetical bias.

The consequential script employed here is mainly inspired by Bulte et al. (2005)

Table 2: **Variable Definitions and Descriptive Statistics**

Variable Name	Variable Definition	Means	Std. Dev.
Age	Age of respondent	55.4	13.2
Female	Dummy: 1 if respondent is female	0.313	–
Children	Dummy: 1 if respondent has children	0.705	–
College degree	Dummy: 1 if household head has a college degree	0.324	–
Consequentiality	Dummy: 1 if respondent believes that surveys influence the political decision making	0.602	–
1 Cent	Dummy: 1 if respondent was asked whether to accept a 1 Cent increase in the EEG Surcharge	0.335	–
2 Cents	Dummy: 1 if respondent was asked whether to accept a 2 Cent increase in the EEG Surcharge	0.334	–
4 Cents	Dummy: 1 if respondent was asked whether to accept a 4 Cent increase in the EEG Surcharge	0.331	–
Low income	Dummy: 1 if net monthly household income is lower than €1,200	0.067	– –
Medium income	Dummy: 1 if net monthly household income is between €1,200 and €2,700	0.369	–
High income	Dummy: 1 if net monthly household income is between €2,700 and €4,200	0.293	–
Very high income	Dummy: 1 if net monthly household income exceeds €4,200	0.158	–
Missing income	Dummy: 1 if respondent did not disclose income	0.113	–
1 Person	Dummy: 1 if # household members equals 1	0.265	–
2 Persons	Dummy: 1 if # household members equals 2	0.486	–
3 Persons	Dummy: 1 if # household members equals 3	0.131	–
$>$ 3 Persons	Dummy: 1 if # household members $>$3	0.118	–
OE	Dummy: 1 if respondent received the WTP question in the open-ended format	0.473	–
More time	Dummy: 1 if respondent took longer to finish the survey than median duration	0.535	–
Consequential script	Dummy: 1 if household received a consequential script	0.507	–
Number of Observations:	6,092		

and condensed as much as possible to avoid that panelists ignore the script simply because of the time requirements for reading the text:

> "We would like to point out that this survey is part of a research project on behalf of the German Federal Ministry of Education and Research (BMBF). The results of this survey will be made available to policy makers and serve as a basis for future decisions, especially with respect to the future level of the surcharge for the promotion of renewable energy technologies (EEG

Levy). To reach meaningful conclusions, it is therefore important that you provide exactly the amount that you actually would be willing to pay at most."

Finally, as economic theory suggests that consequentiality is needed for incentive compatibility (e.g. Carson and Groves, 2007; Vossler et al., 2012), we explore whether there are significant discrepancies in the WTP bids for those respondents who believe that their responses may have political consequences. To this end, in a follow-up question, respondents were requested to provide their judgement with respect to the political consequences of their responses:

"How likely do you believe that results of surveys, such as the present one, influence policy decisions on the amount of the surcharge for the promotion of renewable energy technologies (EEG Levy)?"

The answers to this question, captured by the variable *Consequential*, are measured on a 5-point Likert scale, where 1 stands for "Very unlikely" and 5 indicates "Very likely".

Following Vossler and Watson (2013), we assign those respondents who chose the option "Very unlikely" to the group that is called here inconsequential group, but all others to the consequential group, an assignment reflected by the dummy variable *Consequentiality*:

$$Consequentiality = \begin{cases} 1 & \text{if } Consequential \geq 2, \\ 0 & \text{if } Consequential = 1. \end{cases} \tag{1}$$

This assignment is in accordance with the so called "knife-edge result" found in economic theory, reflecting the distinction between people who believe that their responses might influence the action of policy makers, at least to some extent, and those who do not see any link between surveys and policy actions (Carson and Groves, 2007; Herriges et al., 2010; Vossler et al., 2012).[4]

[4] As a robustness check, we employ various definitions of the *Consequentiality* variable, where assign-

About 60% of the respondents selected themselves into the consequential group (Table 2). The resulting share of almost 40% of the inconsequential group is rather high compared to the literature, where the respective shares range from 4% in the study by Herriges et al. (2010) up to 30% in Hwang et al. (2014). Part of the discrepancy between these shares and the findings received from the literature may be due to the fact that most studies originate from the US and relate to contexts other than the promotion of green electricity. Another reason for the discrepancy might be the particularity that German households are obliged to pay the surcharge for the promotion of green electricity without exception.

3 Descriptive Statistics

To compare responses across elicitation formats, we follow Balistreri et al. (2001) and convert the WTP bids originating from the OE questions into binary values by assuming that respondents would have accepted a randomly given increase in the EEG Levy of either 1, 2, or 4 cents if their OE bid were to be at least as large as the respective levy increase, thereby randomly allocating the continuous bids from the OE format to either of the three levy increases. The random assignment of participants was accomplished by drawing a number between 0 and 1 from a uniform distribution for each individual. Upon sorting these numbers, we split the respondents into three disjunct groups: The first third of respondents whose attributed numbers were lower than 1/3 was assigned to the 1-cent group, the second third into the 2-cent group and the "upper" third with attributed numbers between 2/3 and 1 was assigned to the 4-cent group. Likewise, we separately applied this procedure to those OE respondents who received the script and those who did not. Note that randomization in the transformation of the continu-

ment to the consequential group is restricted to respondents indicating higher belief in consequentiality (see Table A2 in the appendix). We find that the more restrictive the assignment to the consequential group is, the lower gets the difference between OE and SBC contingent valuation. In another robustness check, in Table A3 of the appendix, we present the results when using the ordinal variable *Consequential*, rather than the binary variable *Consequentiality*, suggesting that large effects arise from a consequential level of 3 and higher.

ous WTP bids into 0/1 values is highly important for getting unbiased estimates of the difference between valuation formats (Balistreri et al., 2001).

The panel at the right-hand side of Table 3 reports the results of this exercise, that is, the shares of those respondents who would accept a future increase in the surcharge for the promotion of green electricity (EEG Levy) of either 1, 2, or 4 cents. As economic theory suggests, for both formats, a stronger increase in this levy comes with a decrease in the acceptance rates. From a casual inspection, except for the strongest increase in the promotion cost of green electricity of 4 cents per kWh, we see substantial differences in the acceptance rates of further cost increases across formats: Apparently, the mean acceptance rates are much higher for respondents who are faced with OE questions.[5]

Table 3: **Acceptance Rates of a Rise in the Promotion Cost of Renewable Technologies across Elicitation Formats**

	Single-Binary-Choice Format		Open-Ended Format		
	Number of Observations	Share of Yes Responses	Number of Observations	Share of Yes Responses	t Statistics
1 Cent	1,086	53.6%	951	70.5%	-7.93***
2 Cents	1,062	46.3%	978	57.4%	-5.01***
4 Cents	1,064	33.7%	951	33.7%	0.03
Total	3,212	44.6%	2,880	53.9%	-7.26***

Note: * denotes significance at the 5 %-level, ** at the 1 %-level, and *** at the 0.1 %-level.

This impression can be confirmed using a t test based on the following test statistics:

$$t = \frac{\overline{x}_{SBC} - \overline{x}_{OE}}{s_p \sqrt{\frac{1}{n_{SBC}} + \frac{1}{n_{OE}}}}, \tag{2}$$

where $\overline{x}_{SBC}$ and $\overline{x}_{OE}$ denote the mean acceptance rates of the SBC and OE valuation groups, respectively, n_{SBC} and n_{OE} the respective sample sizes, and s_p is the pooled

[5]The mean and the standard deviation of the open-ended bids amount to 4.3 and 22.3 cents, respectively. The lower, medium, and upper quartiles, that is, the 25%, 50%, and 75% percentiles read 0, 2, and 5 cents, respectively, the 90% and 99% percentiles are given by 10 and 28 cents. The four highest values read 140, 300, 500 and 1,000 cents, 0 is the smallest value by construction.

standard deviation of the acceptance rates of the two subgroups. The resulting t statistics, reported in the last column of Table 3, indicate that the difference between both formats is statistically significantly different from 0 for levy increases of 1 and 2 cents, but not for an increase of 4 cents.

With respect to consequentiality, there are dramatic discrepancies across the consequential and inconsequential groups. This is indicated by the t statistics on the differences in the shares of yes responses across both groups, which are reported in Table 4 and calculated analogous to Equation 2. In line with the existing literature (e.g. Czajkowski et al., 2017, Hwang et al., 2014, Vossler and Watson, 2013), we find for both elicitation formats that acceptance rates are significantly higher for respondents who believe that their responses might influence policy makers. This finding is further supported when using the information on the continuous bids from the open-ended question: with 1 cent, the median open-ended bid for the inconsequential group is lower than the median of 3 cents for the consequential group.

Table 4: **Acceptance Rates of the Promotion Cost of Renewable Technologies when Elicitation Formats are Crossed with Consequentiality**

	Single-Binary-Choice Format					Open-Ended Format				
	Inconsequential Group		Consequential Group			Inconsequential Group		Consequential Group		
	# of Obs.	Share of Yes	# of Obs.	Share of Yes	t Statistics	# of Obs.	Share of Yes	# of Obs.	Share of Yes	t Statistics
1 Cent	406	32.0%	666	66.5%	11.65***	380	53.2%	561	81.8%	9.91***
2 Cents	398	21.6%	651	61.4%	13.61***	380	42.9%	592	66.6%	7.48***
4 Cents	446	13.0%	603	49.3%	13.24***	391	23.0%	552	41.1%	5.90***
Total	1,250	21.9%	1,920	59.4%	22.29***	1,151	39.5%	1,705	63.3%	12.87***

Note: * denotes significance at the 5 %-level, ** at the 1 %-level, and *** at the 0.1 %-level.

4 Methodology

Pooling the observations from both elicitation formats, we estimate both a probit and a linear probability model (LPM) based on the following specification:[6]

$$\begin{aligned} Yes_i &= \beta_0 + \beta_1 OE_i + \beta_2\, 2\, Cents_i + \beta_3\, 4\, Cents_i \\ &\quad + \beta_4 Consequentiality_i + \beta_5 (Consequentiality_i * OE_i) \\ &\quad + \delta^T \mathbf{x}_i + \epsilon_i \,, \end{aligned} \tag{3}$$

where Yes_i is a dummy variable that equals unity if individual i accepts a given increase in the EEG Levy and zero otherwise. OE_i is a dummy variable that tells us whether respondent i received the corresponding question in the OE format. 2 *Cents* and 4 *Cents* are dummy variables that indicate whether this increase amounts to 2 or 4 cents, respectively, with 1 cent being the base category.

$\mathbf{x}$ denotes a vector of socio-economic characteristics, such as gender, age, and education of the household head, as well as household size and income, while δ is the corresponding vector of coefficients and ϵ designates an idiosyncratic error term. Most notably, Equation 3 includes the dummy variable *Consequentiality*, reflecting respondents' belief that their responses may have political consequences. To explore whether this belief affects responses differently across elicitation formats, the interaction term $Consequentiality_i * OE_i$ is added to Equation 3.

To cope with the potential endogeneity of consequentiality, we employ an endogenous switching regression model (see Maddala, 1983, pp. 223-228). This is a widely used method to cope with potential endogeneity of self selection of individuals in various research areas (see for example Abdulai and Huffman, 2014, Czarnitzki and Hottenrott, 2017 and Di Falco et al., 2011). Employing such a model has several advantages relative to other methods, such as an instrumental variable approach. Most notably, an endogenous switching regression model allows for differentiated effects of

[6]Following Angrist and Pischke (2009), who recommend estimating linear probability models (LPMs), rather than nonlinear models, to avoid distributional assumptions, we present the LPM results as a robustness check in Table 5 and Table A6 of the appendix.

all covariates, such as income, on WTP, conditional on the respondent's consequentiality status. This is important, as Vossler and Watson (2013) empirically demonstrated that the effect of covariates might differ conditional on whether a respondent believes the survey will be used to inform policy-makers.

The first stage of our endogenous switching regression model divides respondents into two regimes, those who believe that their responses may have political consequences to at least some extent and those who do not:

$$\begin{aligned} &Consequentiality_i = 1 \qquad \text{if } \gamma^T \cdot \mathbf{z}_i \geq u_i, \\ &Consequentiality_i = 0 \qquad \text{otherwise,} \end{aligned} \tag{4}$$

where vector $\mathbf{z}_i$ includes factors that may affect whether a household head i either believes that the answer influences political decision making ($Consequentiality_i = 1$) or regards this as very unlikely ($Consequentiality_i = 0$). The unknown parameter vector γ that determines the consequentiality status can be estimated – up to a scale factor – using standard probit maximum likelihood methods, where, due to the indeterminacy of the scale factor, $Var(u_i) = 1$ can be assumed.

Depending on consequentiality status, the second-stage equations of this endogenous switching regression model are given by:

$$Yes_{1i} = \boldsymbol{\beta}_1^T \cdot \mathbf{x}_{1i} - \sigma_{1u} \cdot \text{IVM}_{1i} + \varepsilon_{1i}, \text{ if } Consequentiality_i = 1, \tag{5}$$

$$Yes_{0i} = \boldsymbol{\beta}_0^T \cdot \mathbf{x}_{0i} + \sigma_{0u} \cdot \text{IVM}_{0i} + \varepsilon_{0i}, \text{ if } Consequentiality_i = 0, \tag{6}$$

where ε_{1i} and ε_{0i} are residuals with zero conditional mean, Yes_{1i} and Yes_{0i} denote dummy variables that equal unity if household head i accepts a given increase in the EEG Levy and zero otherwise. $\mathbf{x}_{1i}$ and $\mathbf{x}_{0i}$ include their determinants, such as income, while $\boldsymbol{\beta}_1$ and $\boldsymbol{\beta}_0$ are vectors of the associated parameters to be estimated.

The two variables

$$\text{IVM}_{1i} := \frac{\phi(\gamma^T \cdot \mathbf{z}_i)}{\Phi(\gamma^T \cdot \mathbf{z}_i)}, \qquad \text{IVM}_{0i} := \frac{\phi(\gamma^T \cdot \mathbf{z}_i)}{1 - \Phi(\gamma^T \cdot \mathbf{z}_i)} \tag{7}$$

represent variants of the inverse Mills ratios, with $\phi(.)$ and $\Phi(.)$ denoting the density and cumulative density function of the standard normal distribution, respectively.

When appended as extra regressors in the second-stage estimation, the inverse Mills ratios are controls for potential biases arising from sample selectivity: It is likely that unobservable factors, such as carelessness about electricity bills, affect WTP bids. If the estimates of the coefficients σ_{1u} and σ_{0u} are statistically significant, this is an indication of sample selectivity. For the second-stage estimation, we insert the predicted values $\widehat{\text{IVM}}_{1i}$ and $\widehat{\text{IVM}}_{0i}$ using the probit estimates $\widehat{\gamma}$ of the first-stage estimation. Given that the variance of the residuals is heteroscedastic in nature (see Maddala, 1983, p. 225), Equations 5 and 6 should be estimated by weighted least squares using the Huber-White estimates of variance.[7]

For the identification of the switching regression model, non-linearity of the specification is sufficient (Cameron and Trivedi, 2009). For a more robust identification, it is typically recommended to impose exclusion restrictions. This condition requires at least one variable that determines the discrete first-stage outcome on consequentiality, but does not affect the WTP response described by the second-stage model. As a first candidate for an exclusion restriction, we employ the dummy variable *more time*, which equals unity if a respondent needed more time to complete the questionnaire than the median duration of 22.55 minutes and zero otherwise (see Table 2).

Assuming that this variable is uncorrelated with an individual's WTP, it is not included in the second-stage regression, but we expect it to be relevant for the first stage: respondents who take more time to reflect about their answers to the survey may believe their answers to have some effect on policy making. Indeed, the estimation results presented in the subsequent section provide evidence for a positive, statistically significant correlation between this indicator and consequentiality.

As a second exclusion restriction, we employ the dummy variable *Consequential script*, indicating whether a survey participant received a consequential script. Receiving the consequential script should clearly influence people's belief in political con-

[7] To check the robustness of the results, in addition to employing this two-stage procedure, using Full Information Maximum Likelihood (FIML) methods, we estimate a selection model that is identical to our switching regression model with respect to the variables employed. The estimates are reported in Table A8 of the appendix and are virtually identical to those of the switching regression model.

sequentiality (e. g. Bulte et al., 2005), as it explicitly emphasizes that the results of the study will be made available to policy makers and will be used for political decision making (see Section 2). This conjecture is confirmed by the estimation results presented in the subsequent section, which indicate a positive correlation between receiving the consequential script and consequentiality status. With respect to the second requirement for exclusion restrictions, we assume that receiving the script only indirectly influences the WTP, through the belief in consequentiality, but that there is no direct effect on respondents' WTP.

5 Results

Estimating a probit model that is based on Specification 3 reconfirms the descriptive findings presented in Section 3: The acceptance rates resulting from the OE questions tend to be higher than those originating from the SBC format (Table 5). These results strongly contrast with the majority of empirical analyses, most notably with those of Seller et al. (1985), who elicit WTP estimates from the SBC format that are up to four times as large as those originating from the OE format. Other studies, such as Kealy and Turner (1993) and Halvorsen and Sœlensminde (1998), find OE estimates that are about half as large as those of the SBC format. Compared to these studies, the positive impact of the OE format of about 20 percentage points is opposite in sign and rather moderate, but significant in statistical and economic terms. It is also of note that in terms of signs, magnitudes, and significance levels, the estimation results resulting from the linear probability model (LPM), reported at the right-hand panel of Table 5, mimic the marginal effects originating from the probit model.

Furthermore, in line with economic theory, strong increases in the EEG Levy have a negative effect on the acceptance of this additional burden for German households, with the effect being most pronounced in case of a 4-cents increase. Of the socio-economic characteristics, higher age, being female and having a college education are associated with higher WTP values, while having children moderates the WTP for

green electricity.

Table 5: **Probit and Linear Probability Model Estimation Results for the Acceptance of Future Rises in the Promotion Cost of Green Electricity**

Dependent variable:	Probit Model $P(Yes_i = 1)$				Linear Probability Model Yes_i	
	Coeff. s	Std. Errors	Marg. Effects	Std. Errors	Coeff. s	Std. Errors
OE	0.585***	(0.061)	0.202***	(0.020)	0.190***	(0.019)
2 Cents	-0.291***	(0.044)	-0.100***	(0.015)	-0.103***	(0.016)
4 Cents	-0.749***	(0.046)	-0.258***	(0.014)	-0.263***	(0.015)
Consequentiality	0.962***	(0.054)	0.332***	(0.017)	0.332***	(0.017)
Consequentiality * OE	-0.400***	(0.076)	-0.138***	(0.026)	-0.124***	(0.026)
Female	0.228***	(0.041)	0.079***	(0.014)	0.079***	(0.014)
Children	-0.154**	(0.050)	-0.053**	(0.017)	-0.052**	(0.017)
Age	0.005**	(0.002)	0.002**	(0.001)	0.002**	(0.001)
College degree	0.179***	(0.041)	0.062***	(0.014)	0.063***	(0.014)
High income	0.016	(0.057)	0.006	(0.020)	0.008	(0.020)
Medium income	-0.078	(0.060)	-0.027	(0.021)	-0.024	(0.021)
Low income	-0.112	(0.096)	-0.039	(0.033)	-0.036	(0.033)
Missing income	-0.170*	(0.076)	-0.059*	(0.026)	-0.058*	(0.026)
1 Person	0.012	(0.078)	0.004	(0.027)	0.004	(0.027)
2 Persons	-0.132*	(0.066)	-0.045*	(0.023)	-0.045*	(0.023)
3 Persons	-0.074	(0.074)	-0.026	(0.025)	-0.025	(0.025)
Constant	-0.685***	(0.108)	–	–	0.268***	(0.037)
Number of Observations:	5,249		5,249		5,249	

Note: * denotes significance at the 5 %-level, ** at the 1 %-level, and *** at the 0.1 %-level.

Most notably, we again find a positive correlation between WTP and political consequentiality: The belief in political consequences is associated with a higher WTP of approximately 33 percentage points. This outcome is in line with the studies by Herriges et al. (2010), Hwang et al. (2014), Vossler and Watson (2013), and Vossler and Holladay (2018), who also find a higher WTP for individuals who believe that their responses might influence policy makers.

Another result also bears noting: the negative coefficient on the interaction term *Consequentiality * OE* indicates that the difference between OE and SBC contingent valuation is reduced, to less than 7 percentage points when focusing on those individuals

who perceive their answer as politically consequential. While political consequentiality is associated with a higher WTP, the negative interaction effect indicates that by focusing on those individuals who perceive the survey as politically consequential, the gap between the WTP bids from the OE format and the incentive-compatible SBC format shrinks. The positive correlation between WTP and political consequentiality is reconfirmed when focusing on the responses from SBC formats alone (see Table A4 of the appendix). Likewise, when focusing on the response from the OE format, the OLS estimation results presented in Table A5 of the appendix indicate that those who believe the survey to have political consequences have a higher WTP for green electricity, by 1,55 cents per kWh on average.

To address potential sample selectivity problems with respect to consequentiality, we have additionally estimated an endogenous switching regression model as given by Equations 5 and 6. Using the two-step approach described in the methodology section, the first-stage results indicate that consequentiality is positively correlated with the two variables employed to fulfill the exclusion restrictions (Table 6), the indicator that a respondent needs more time than the median duration to complete the survey, as well as the indicator that a respondent was confronted with a consequential script.[8]

Yet, as the estimates of the inverse Mills ratios of the second-stage estimation are not statistically significantly different from zero, we cannot reject the null hypothesis of no sample selectivity. While it thus remains unclear whether there is sample selection, statistical test theory would suggest sticking with the estimates of the switching regression model. The results turn out to be robust, though, when sample selectivity issues are ignored and, hence, the inverse mills ratio are omitted when estimating Equations 5 and 6 (see Table A7 in the appendix). In fact, the results of Table 6 and Table A7 are

[8]One might argue that the indicator that a respondent needs more time for the completion of the questionnaire might not be exogenous and, hence, not an appropriate exclusion restriction. Refraining from this exclusion restriction, to probe our estimation results in this respect, we additionally estimate the switching regression model with the indicator that a respondent was confronted with a consequential script as the sole exclusion restriction. The results, presented in Table A9 of the appendix are virtually the same as in Table 6.

Table 6: **Two-Stage Estimation Results for the Endogenous Switching Regression Model**

Dependent variable:	First Stage		Second Stage			
	$P(Consequentiality = 1)$		Consequentiality = 0 $Yes_{0i} = 1$		Consequentiality = 1 $Yes_{1i} = 1$	
	Coeff.s	Std. Errors	Coeff.s	Std. Errors	Coeff.s	Std. Errors
OE	-0.043	(-1.22)	0.188***	(9.47)	0.067***	(3.93)
2 Cents	0.000	(0.00)	-0.088***	(-3.48)	-0.114***	(-5.75)
4 Cents	-0.081	(-1.88)	-0.237***	(-9.53)	-0.284***	(-12.80)
Female	0.107**	(2.72)	0.108***	(4.31)	0.061**	(2.92)
Children	-0.079	(-1.62)	-0.048	(-1.70)	-0.057*	(-2.37)
Age	-0.001	(-0.30)	0.001	(1.21)	0.002**	(3.18)
College degree	0.302***	(7.56)	0.059	(1.54)	0.069*	(2.09)
High income	0.068	(1.22)	-0.009	(-0.28)	0.017	(0.66)
Medium income	-0.070	(-1.20)	-0.060	(-1.79)	-0.001	(-0.02)
Low income	-0.177	(-1.94)	-0.030	(-0.56)	-0.044	(-0.92)
Missing income	-0.256***	(-3.60)	-0.037	(-0.76)	-0.088*	(-2.00)
1 Person	0.150*	(1.98)	-0.005	(-0.12)	0.011	(0.28)
2 Persons	0.067	(1.05)	-0.030	(-0.87)	-0.055	(-1.73)
3 Persons	0.210**	(2.98)	0.003	(0.07)	-0.040	(-1.02)
More time	0.162***	(4.35)	–	–	–	–
Consequential script	0.089*	(2.51)	–	–	–	–
IVM_0	–	–	-0.092	(-0.59)	–	–
IVM_1	–	–	–	–	-0.056	(-0.33)
Constant	0.084	(0.84)	0.380*	(2.55)	0.622***	(4.84)
Number of Observations:	5,249		2,065		3,184	

Note: * denotes significance at the 5 %-level, ** at the 1 %-level, and *** at the 0.1 %-level.

virtually identical.

The coefficient estimates of the second-stage regression (Table 6) reconfirm the estimation results obtained from both the LPM and probit model (see Table 5). Most notably, from the coefficient estimate on the OE dummy in the second-stage regression, we see again that the difference between both valuation formats shrinks if we only take into account people who perceive their answer as politically consequential, to less than 7 percentage points. The similarity of the results of the switching regression model

and those presented in Table 5 may be another indication for the absence of sample selectivity.

6 Summary and Conclusions

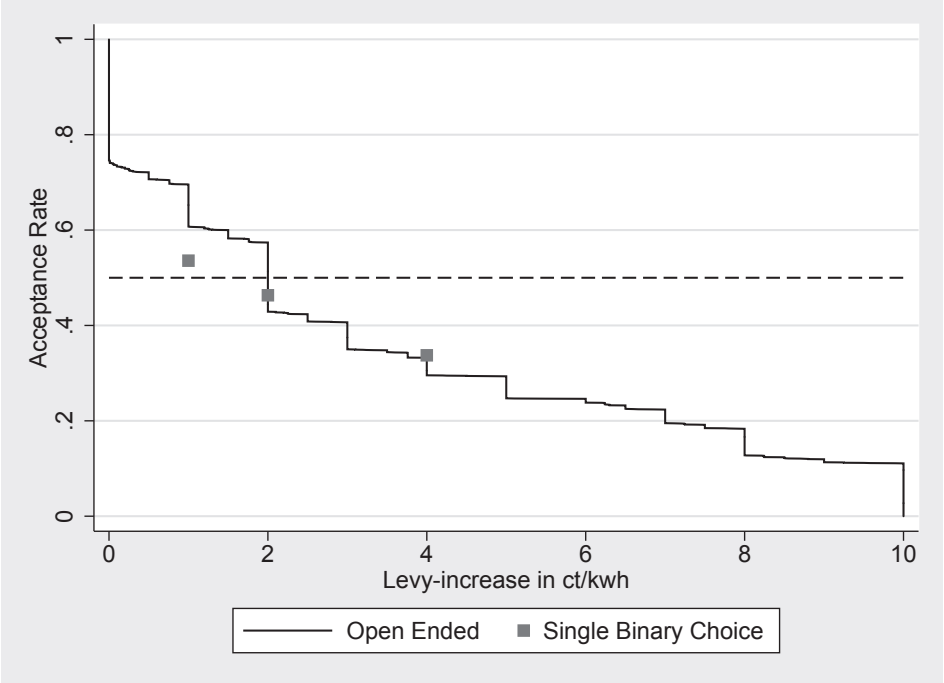
The empirical results received from experiments indicate large differences in WTP estimates across Single-binary-choice (SBC) and open-ended (OE) formats (Seller et al., 1985; Kealy and Turner, 1993; Brown et al., 1996; Halvorsen and Sœlensminde, 1998; Balistreri et al., 2001; Poe et al., 2002). Based on hypothetical responses originating from a large-scale survey among more than 6,000 German households on their willingness-to-pay (WTP) for green electricity, this paper has provided further evidence on the discrepancy between the outcomes of SBC and OE contingent valuation methods, thereby accounting for perceived consequentiality for policy making. Theoretical work suggests that survey-based assessments of consequentiality are integral to the analysis of stated-preference (SP) data (Vossler and Watson, 2013). A distinguishing feature of our study is that it is the first that compares OE and SBC question formats while simultaneously controlling for policy consequentiality. In addition, recognizing that a respondent's consequentiality status and WTP might be jointly influenced by unobservable factors, we have estimated a switching regression model that accounts for the potential endogeneity of respondents' belief in political consequences.

Consistent with the results of Czajkowski et al. (2017), Herriges et al. (2010), Hwang et al. (2014), Nepal et al. (2009), Vossler and Watson (2013), and Vossler and Holladay (2018), we find a positive relationship between consequentiality and WTP, an outcome that Vossler and Watson (2013) call negative hypothetical bias: those respondents who perceive the survey to have political consequences exhibit a WTP that, on average, is higher than those who do not expect such consequences. Thus, we provide further evidence on this empirical result that may reverse the common perception that SP methods overestimate non-market values.

While these findings have profound implications for the interpretation of the re-

sults of former SP studies (Vossler and Watson, 2013), a suite of other key outcomes emerge from our empirical analysis. First, the acceptance rates of potential increases of the levy to support the future expansion of renewable energy technologies are generally higher for the OE format than those originating from the SBC format (Figure 1). For example, a 1-cent increase in the support level for green electricity, that is, an increase by about 16% relative to the EEG levy of 6.17 cents per kWh in 2015, would have been accepted by about 60% of the respondents of the OE subgroup, whereas the share of respondents of the SBC subgroup who would have tolerated such an increase is somewhat smaller and amounts to 53.6%. A similar picture showing higher acceptance rates for the OE subgroup could be drawn when focusing on the consequentiality subsample, that is, those subjects who perceive the survey to be politically influential – see Figure A1 of the appendix, which illustrates the support for renewable energy technologies across the consequential and inconsequential group.

Figure 1: **Policy support for Potential Increases in the EEG Levy to Support the Future Expansion of Renewable Energy Technologies**



Although the WTP bids from the OE format are generally expected to be higher, numerous empirical analyses, such as Halvorsen and Sœlensminde (1998), Kealy and

Turner (1993), and Seller et al. (1985), obtained the opposite result. Inspired by this puzzle, Carson and Groves (2007) theoretically discuss the circumstances under which either outcome can be expected. Notably, signaling large WTP bids may be the result of strategic considerations and an optimal strategy if an individual's WTP is higher than the potential costs of providing a public good, being in perfect accord with economic theory. In the specific case of green electricity, large WTP bids may indicate strong preferences for its provision, not least based on green attitudes. In fact, exaggerating WTP bids might be a straightforward strategy to signal support for renewable energy policies (Whitehead and Cherry, 2007). Furthermore, Zawojska et al. (2019) find that policy consequentiality lowers the sensitivity to costs, thereby potentially increasing individuals' WTP.

Most relevant from a policy perspective is the result that the majority of respondents who received the question in the OE format would have accepted an additional increase of 2 cents in the EEG Levy, whereas only an increase of 1 cent per kWh would have been accepted by more than 50% of the respondents who received the respective question in the SBC format (Figure 1). Based on these results, we conclude that the tolerance of the majority of consumers with respect to further increases in the support level of renewable energy technologies may be almost exhausted.

Finally, our empirical results suggest that the discrepancy between both elicitation formats is strongly reduced when focusing on those individuals who perceive the survey as politically consequential, a result that is also found in a recent study by Vossler and Holladay (2018) on the comparison of the standard OE and SBC format. Assuming that the SBC format is incentive-compatible and reveals the true WTP, this outcome indicates that the negative hypothetical bias can be reduced by focusing on those individuals who perceive the survey as politically consequential.

Appendix

Table A1: **Comparing the Means of the Explanatory Variables Across Subgroups**

	Open-Ended Format	Single-Binary-Choice Format			
		Total	1-Cent Group	2-Cents Group	4-Cents Group
Age	55.2	55.6	55.6	55.9	55.4
Female	0.319	0.309	0.298	0.324	0.304
Children	0.704	0.706	0.707	0.721	0.689
College degree	0.330	0.319	0.324	0.318	0.316
Consequentiality	0.597	0.606	0.621	0.621	0.575
1 Cent	0.331	0.338	1.000	0.000	0.000
2 Cents	0.340	0.331	0.000	1.000	0.000
4 Cents	0.330	0.331	0.000	0.000	1.000
Low income	0.066	0.068	0.068	0.073	0.065
Medium income	0.358	0.379	0.385	0.372	0.380
High income	0.308	0.280	0.269	0.276	0.295
Very high income	0.159	0.156	0.162	0.166	0.141
Missing income	0.109	0.116	0.117	0.112	0.120
More time	0.561	0.511	0.523	0.524	0.485
Consequential script	0.514	0.500	0.492	0.506	0.504
Household size:					
1 Person	0.260	0.269	0.271	0.260	0.275
2 Persons	0.494	0.479	0.491	0.485	0.462
3 Persons	0.133	0.130	0.119	0.125	0.145
$>$ 3 Persons	0.119	0.122	0.118	0.129	0.118
Number of Observations:	2,880	3,212	1,086	1,062	1,064

Table A2: **Linear Probability Model Estimation Results for various Assignments to the Consequential Group**

Dependent variable:	Consequentiality = 1 if Consequential > 1 Yes_i		Consequentiality = 1 if Consequential > 2 Yes_i		Consequentiality = 1 if Consequential > 3 Yes_i		Consequentiality = 1 if Consequential > 4 Yes_i	
	Coeff. s	Std. Errors	Coeff. s	Std. Errors	Coeff. s	Std. Errors	Coeff. s	Std. Errors
OE	0.190***	(0.019)	0.159***	(0.016)	0.122***	(0.014)	0.114***	(0.013)
2 Cents	-0.103***	(0.016)	-0.101***	(0.016)	-0.101***	(0.016)	-0.104***	(0.016)
4 Cents	-0.263***	(0.015)	-0.263***	(0.015)	-0.268***	(0.016)	-0.273***	(0.016)
I(Consequential > 1)	0.332***	(0.017)	–	–	–	–	–	–
I(Consequential > 1) * OE	-0.124***	(0.026)	–	–	–	–	–	–
I(Consequential > 2)	–	–	0.317***	(0.019)	–	–	–	–
I(Consequential > 2) * OE	–	–	-0.136***	(0.027)	–	–	–	–
I(Consequential > 3)	–	–	–	–	0.190***	(0.029)	–	–
I(Consequential > 3) * OE	–	–	–	–	-0.092*	(0.041)	–	–
I(Consequential > 4)	–	–	–	–	–	–	0.046	(0.049)
I(Consequential > 4) * OE	–	–	–	–	–	–	-0.084	(0.071)
Female	0.079***	(0.014)	0.077***	(0.014)	0.091***	(0.015)	0.090***	(0.015)
Children	-0.052**	(0.017)	-0.053**	(0.018)	-0.062***	(0.018)	-0.062***	(0.018)
Age	0.002**	(0.001)	0.002**	(0.001)	0.002***	(0.001)	0.002***	(0.001)
College degree	0.063***	(0.014)	0.082***	(0.014)	0.087***	(0.015)	0.093***	(0.015)
High income	0.008	(0.020)	0.013	(0.020)	0.011	(0.021)	0.014	(0.021)
Medium income	-0.024	(0.021)	-0.022	(0.021)	-0.030	(0.022)	-0.031	(0.022)
Low income	-0.036	(0.033)	-0.045	(0.034)	-0.055	(0.035)	-0.054	(0.035)
Missing income	-0.058*	(0.026)	-0.068**	(0.026)	-0.082**	(0.027)	-0.085**	(0.027)
1 Person	0.004	(0.027)	0.009	(0.027)	0.019	(0.028)	0.021	(0.028)
2 Persons	-0.045*	(0.023)	-0.040	(0.023)	-0.037	(0.023)	-0.036	(0.024)
3 Persons	-0.025	(0.025)	-0.019	(0.025)	-0.007	(0.026)	-0.004	(0.026)
Constant	0.268***	(0.037)	0.374***	(0.036)	0.430***	(0.037)	0.453***	(0.037)
Number of Observations:	5,249		5,249		5,249		5,249	

Note: * denotes significance at the 5 %-level, ** at the 1 %-level, and *** at the 0.1 %-level. For k = 1, 2, 3, 4, I(Consequential > k) = 1 if Consequential > k and 0 otherwise.

Table A3: **Probit and Linear Probability Model Estimation Results for the Acceptance of Future Rises in the Promotion Cost of Green Electricity when various Consequential Levels are Considered.**

Dependent variable:	Probit Model $P(Yes_i = 1)$				Linear Probability Model Yes_i	
	Coeff. s	Std. Errors	Marg. Effects	Std. Errors	Coeff. s	Std. Errors
OE	0.584***	(0.061)	0.198***	(0.020)	0.190***	(0.019)
2 cents	-0.295***	(0.045)	-0.100***	(0.015)	-0.103***	(0.016)
4 cents	-0.752***	(0.046)	-0.255***	(0.014)	-0.260***	(0.015)
I(Consequential = 2)	0.698***	(0.064)	0.237***	(0.021)	0.232***	(0.021)
I(Consequential = 3)	1.241***	(0.070)	0.421***	(0.021)	0.434***	(0.022)
I(Consequential = 4)	1.236***	(0.103)	0.419***	(0.033)	0.433***	(0.034)
I(Consequential = 5)	0.738***	(0.136)	0.250***	(0.046)	0.248***	(0.050)
I(Consequential = 2) * OE	-0.269**	(0.091)	-0.091**	(0.031)	-0.071*	(0.032)
I(Consequential = 3) * OE	-0.517***	(0.099)	-0.176***	(0.033)	-0.171***	(0.033)
I(Consequential = 4) * OE	-0.463**	(0.150)	-0.157**	(0.051)	-0.155**	(0.049)
I(Consequential = 5) * OE	-0.507**	(0.197)	-0.172**	(0.067)	-0.162*	(0.072)
Female	0.213***	(0.041)	0.072***	(0.014)	0.073***	(0.014)
Children	-0.150**	(0.051)	-0.051**	(0.017)	-0.050**	(0.017)
Age	0.005**	(0.002)	0.002**	(0.001)	0.002**	(0.001)
College	0.182***	(0.041)	0.062***	(0.014)	0.063***	(0.014)
High income	0.028	(0.058)	0.009	(0.020)	0.011	(0.020)
Medium income	-0.067	(0.061)	-0.023	(0.021)	-0.019	(0.021)
Low income	-0.104	(0.097)	-0.035	(0.033)	-0.032	(0.033)
Missing income	-0.166*	(0.077)	-0.056*	(0.026)	-0.055*	(0.026)
1 Person	0.002	(0.078)	0.001	(0.027)	0.000	(0.026)
2 Persons	-0.129	(0.067)	-0.044	(0.023)	-0.043	(0.022)
3 Persons	-0.077	(0.074)	-0.026	(0.025)	-0.026	(0.025)
Constant	-0.640***	(0.109)	–	–	0.282***	(0.036)
Number of Observations:	5,249		5,249		5,249	

Note: * denotes significance at the 5 %-level, ** at the 1 %-level, and *** at the 0.1 %-level.

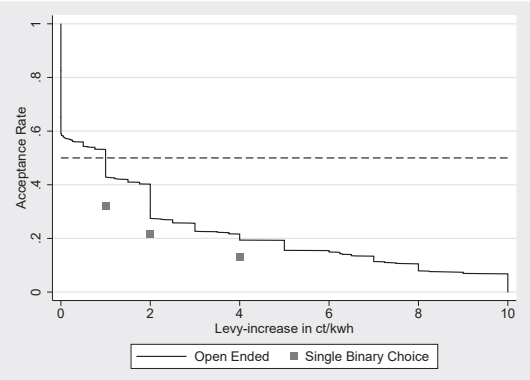
For k = 1, 2, 3, 4, I(Consequential = k) = 1 if Consequential = k and 0 otherwise.

Table A4: **Estimations Results for the Acceptance of Future Rises in the Promotion Cost of Green Electricity for the Single-Binary-Choice-Group**

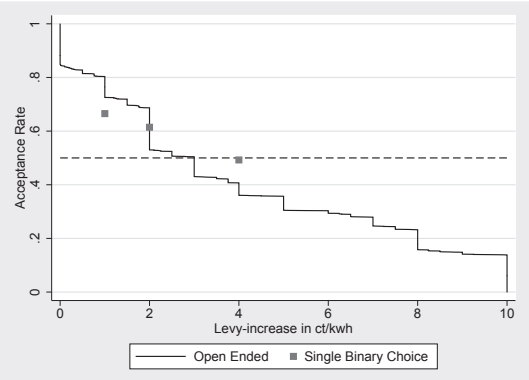
Dependent variable:	Linear Probability Model Yes_i		Probit Model $P(Yes_i = 1)$			
	Coeff.s	Std. Errors	Coeff.s	Std. Errors	Marg. Effects	Std. Errors
2 Cents	-0.070**	(0.022)	-0.199**	(0.063)	-0.067**	(0.021)
4 Cents	-0.179***	(0.021)	-0.533***	(0.064)	-0.180***	(0.021)
Consequentiality	0.351***	(0.018)	0.992***	(0.055)	0.334***	(0.015)
Female	0.082***	(0.020)	0.242***	(0.059)	0.082***	(0.020)
Children	-0.077**	(0.024)	-0.230**	(0.070)	-0.077***	(0.023)
Age	0.002*	(0.001)	0.005*	(0.002)	0.002*	(0.001)
College degree	0.058**	(0.020)	0.166**	(0.058)	0.056**	(0.019)
High income	-0.014	(0.028)	-0.048	(0.082)	-0.016	(0.028)
Medium income	-0.076**	(0.029)	-0.235**	(0.086)	-0.079**	(0.029)
Low income	-0.073	(0.046)	-0.224	(0.134)	-0.075	(0.045)
Missing income	-0.115**	(0.037)	-0.332**	(0.109)	-0.112**	(0.037)
1 Person	0.008	(0.036)	0.022	(0.108)	0.007	(0.036)
2 Persons	-0.069*	(0.031)	-0.206*	(0.093)	-0.069*	(0.031)
3 Persons	-0.042	(0.035)	-0.121	(0.103)	-0.041	(0.035)
Constant	0.318***	(0.050)	-0.520***	(0.145)	–	–
Number of Observations:	2,671		2,671		2,671	

Note: * denotes significance at the 5 %-level, ** at the 1 %-level, and *** at the 0.1 %-level.

Figure A1: **Policy Support for Potential Increases in the EEG Levy to Support the Future Expansion of Renewable Energy Technologies**



(a) Inconsequential Group



(b) Consequential Group

Table A5: **Ordinary Least Squares Estimation Results for the WTP for Green Electricity for the Open-Ended-Group**

Dependent variable:	Linear Probability Model Yes_i	
	Coeff.s	Std. Errors
Consequential	1.550***	(11.79)
Female	0.613***	(4.14)
Children	-0.216	(-1.20)
Age	0.007	(1.10)
High income	-0.266	(-1.29)
Medium income	0.070	(0.31)
Low income	-0.022	(-0.06)
Missing income	-0.382	(-1.45)
1 Person	-0.293	(-1.00)
2 Persons	-0.073	(-0.30)
3 Persons	-0.239	(-0.88)
College degree	0.391**	(2.66)
Constant	1.812***	(5.09)
Number of Observations:	2,352	

Note: * denotes significance at the 5 %-level, ** at the 1 %-level, and *** at the 0.1 %-level. To take care of outliers, bids above the 95-percentile, i.e. above 10 cents, are excluded from the estimation.

Table A6: **Linear Probability Model Estimation Results for the Acceptance of Future Rises in the Promotion Cost of Green Electricity differentiated for Believing in Consequentiality**

Dependent variable:	Consequentiality = 0 Yes_i		Consequentiality = 1 Yes_i	
	Coeff.s	Std. Errors	Coeff.s	Std. Errors
OE	0.190***	(0.019)	0.066***	(0.017)
2 Cents	-0.088***	(0.025)	-0.114***	(0.020)
4 Cents	-0.232***	(0.023)	-0.287***	(0.021)
Female	0.101***	(0.023)	0.065***	(0.018)
Children	-0.043	(0.027)	-0.060**	(0.023)
Age	0.001	(0.001)	0.002**	(0.001)
College degree	0.041	(0.024)	0.078***	(0.018)
High income	-0.014	(0.032)	0.019	(0.026)
Medium income	-0.056	(0.033)	-0.003	(0.028)
Low income	-0.020	(0.050)	-0.050	(0.045)
Missing income	-0.021	(0.039)	-0.096**	(0.036)
1 Person	-0.014	(0.039)	0.016	(0.036)
2 Persons	-0.033	(0.034)	-0.053	(0.031)
3 Persons	-0.010	(0.038)	-0.033	(0.034)
Constant	0.301***	(0.055)	0.582***	(0.046)
Number of Observations:	2,065		3,184	

Note: * denotes significance at the 5 %-level, ** at the 1 %-level, and *** at the 0.1 %-level.

Table A7: **Probit Model for the Acceptance of Future Rises in the Promotion Cost of Green Electricity differentiated for Believing in Consequentiality**

Dependent variable	Consequentiality = 0 $P(Yes_i = 1)$				Consequentiality = 1 $P(Yes_i = 1)$			
	Coefficients		Marginal Effects		Coefficients		Marginal Effects	
OE	0.606***	(0.066)	0.188***	(0.019)	0.166***	(0.048)	0.060***	(0.017)
2 Cents	-0.254***	(0.076)	-0.079***	(0.023)	-0.335***	(0.060)	-0.121***	(0.021)
4 Cents	-0.752***	(0.082)	-0.233***	(0.024)	-0.806***	(0.060)	-0.292***	(0.020)
Script	-0.096	(0.065)	-0.030	(0.020)	0.005	(0.048)	0.002	(0.018)
Female	0.333***	(0.073)	0.103***	(0.022)	0.165**	(0.053)	0.060**	(0.019)
Children	-0.166	(0.088)	-0.052	(0.027)	-0.158*	(0.067)	-0.057*	(0.024)
Age	0.005	(0.003)	0.002	(0.001)	0.006**	(0.002)	0.002**	(0.001)
College Degree	0.111	(0.078)	0.035	(0.024)	0.202***	(0.053)	0.073***	(0.019)
High income	-0.054	(0.100)	-0.017	(0.031)	0.051	(0.071)	0.018	(0.026)
Medium income	-0.221*	(0.104)	-0.069*	(0.032)	-0.006	(0.077)	-0.002	(0.028)
Low income	-0.113	(0.156)	-0.035	(0.048)	-0.129	(0.124)	-0.047	(0.045)
1 Person	-0.045	(0.135)	-0.014	(0.042)	0.036	(0.106)	0.013	(0.038)
2 Person	-0.164	(0.116)	-0.051	(0.036)	-0.128	(0.089)	-0.046	(0.032)
3 Person	-0.114	(0.135)	-0.035	(0.042)	-0.118	(0.096)	-0.043	(0.035)
Constant	0.069	(0.183)	–	–	0.429**	(0.135)	–	–
Number of Observations:	1,812		1,812		2,901		2,901	

Note: Standard Errors are in parentheses, * denotes significance at the 5 %-level, ** at the 1 %-level, and *** at the 0.1 %-level, respectively.

Table A8: **Full Information Maximum Likelihood (FIML) Estimation Results for the Endogenous Switching Regression Model**

	First Stage		Second Stage			
Dependent variable:	$P(Consequentiality = 1)$		Consequentiality = 0 $Yes_{0i} = 1$		Consequentiality = 1 $Yes_{1i} = 1$	
	Coeff.s	Std. Errors	Coeff.s	Std. Errors	Marg. Effects	Std. Errors
OE	-0.029	(0.038)	0.193***	(0.021)	0.058***	(0.017)
2 Cents	0.008	(0.046)	-0.089***	(0.027)	-0.117***	(0.021)
4 Cents	-0.053	(0.046)	-0.235***	(0.024)	-0.300***	(0.022)
Female	0.115**	(0.042)	0.112***	(0.024)	0.060**	(0.020)
Children	-0.073	(0.052)	-0.055*	(0.028)	-0.057*	(0.024)
Age	-0.000	(0.002)	0.002	(0.001)	0.002**	(0.001)
College degree	0.300***	(0.043)	0.046	(0.027)	0.073**	(0.024)
High income	0.065	(0.056)	-0.014	(0.033)	0.018	(0.026)
Medium income	-0.074	(0.059)	-0.066*	(0.033)	-0.003	(0.028)
Low income	-0.184*	(0.093)	-0.039	(0.051)	-0.047	(0.046)
1 Person	0.148	(0.081)	-0.011	(0.042)	0.014	(0.039)
2 Persons	0.055	(0.068)	-0.049	(0.036)	-0.046	(0.033)
3 Persons	0.197**	(0.075)	-0.029	(0.041)	-0.042	(0.037)
More time	0.162***	(0.039)	–	–	–	–
Consequential script	0.084*	(0.038)	–	–	–	–
IVM_0	–	–	0.004	(0.203)	–	–
IVM_1	–	–	–	–	0.087	(0.125)
Constant	0.056	(0.104)	0.330***	(0.079)	0.597***	(0.085)
Number of Observations:	4,713		1,812		2,901	

Note: * denotes significance at the 5 %-level, ** at the 1 %-level, and *** at the 0.1 %-level, respectively.

Table A9: **Two-Stage Estimation Results for the Endogenous Switching Regression Model with only Consequential Script as Exclusion Restriction**

	First Stage		Second Stage			
Dependent variable:	$P(Consequentiality = 1)$		Consequentiality = 0 $Yes_{0i} = 1$		Consequentiality = 1 $Yes_{1i} = 1$	
	Coeff.s	Std. Errors	Coeff.s	Std. Errors	Coeff.s	Std. Errors
OE	-0.034	(0.035)	0.182***	(0.021)	0.068***	(0.018)
2 cents	-0.002	(0.043)	-0.088***	(0.025)	-0.114***	(0.020)
4 cents	-0.084	(0.043)	-0.252***	(0.029)	-0.280***	(0.026)
Female	0.110**	(0.040)	0.127***	(0.032)	0.056*	(0.027)
Children	-0.081	(0.049)	-0.061	(0.032)	-0.053	(0.027)
Age	0.001	(0.002)	0.001	(0.001)	0.002**	(0.001)
College degree	0.294***	(0.040)	0.111	(0.067)	0.055	(0.056)
High income	0.071	(0.056)	0.004	(0.037)	0.014	(0.028)
Medium income	-0.062	(0.058)	-0.070*	(0.035)	0.003	(0.030)
Low income	-0.166	(0.091)	-0.057	(0.061)	-0.036	(0.055)
Missing income	-0.261***	(0.071)	-0.081	(0.067)	-0.075	(0.061)
1 Person	0.146	(0.076)	0.020	(0.049)	0.004	(0.046)
2 Persons	0.067	(0.064)	-0.018	(0.036)	-0.058	(0.033)
3 Persons	0.209**	(0.070)	0.040	(0.058)	-0.050	(0.051)
Consequential script	0.090*	(0.035)	–	–	–	–
IVM_0	–	–	-0.348	(0.313)	–	–
IVM_1	–	–	–	–	-0.138	(0.324)
Constant	0.079	(0.099)	0.605*	(0.279)	0.681**	(0.237)
Number of Observations:	5,249		2,065		3,184	

Note: * denotes significance at the 5 %-level, ** at the 1 %-level, and *** at the 0.1 %-level.

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