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Abstract

Exemptions from costly policy measures are frequently applied to alleviate financial burdens to specific market participants. Using a stated-choice experiment with around 6,000 German household heads, we test how exemptions for low-income households and energy-intensive companies influence the political acceptability of additional cost for the promotion of renewable energies. We find that the support for the policy is substantially higher when low-income households are exempt rather than the industry. Introducing exemptions for low-income households on top of existing exemptions for the industry increases the acceptability of the policy. We show that the support for exemptions as one example of distributional policy design is associated with individual behavioral measures like inequality aversion and fairness perceptions.

Keywords: fairness, distributional effects, environmental policy, exemptions renewable energy, political acceptance, behavioral economics, discrete choice experiment

JEL codes: D03, D12, H41, Q20

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1 Introduction

Distributional consequences of environmental policies have recently received wide-spread attention (e.g., Fischer and Pizer, 2019; Reguant, 2019; Davis and Knittel, 2019; Cronin et al., 2019; Levinson, 2019). Fischer and Pizer (2019), for example, identify trade offs between efficiency and horizontal equity in addition to vertical equity when designing carbon policies, primarily focussing on the redistribution of carbon tax revenues. Reguant (2019) discusses tensions between distributional effects and efficiency for the cost pass-through of renewable energy policies.

Besides affecting the cost distribution across households, the specific implementation of environmental policies also affects the distribution of burdens across industries (Hagem et al., 2020). Energy-intensive companies are frequently eligible for special provisions or even exempt from costly policy measures to protect their international competitiveness (CEER, 2017; Ekins and Speck, 1999). Overall welfare costs typically increase due to such exemptions (e.g., Böhringer and Rutherford, 1997), even though potential benefits have also been studied on theoretical grounds (e.g., Kaplow, 2019). Partly, special provisions are rather seen as resulting from lobbying by special interest groups (e.g., Anger et al., 2015; Hu et al., 2020), thus indicating an interaction with the acceptability of policy measures among specific industrial sectors. Andor et al. (2018) show that existing industry exemptions are widely opposed by the German population: their existence significantly decreases the willingness to shoulder financial burden for a more sustainable energy use.

With this paper, we contribute to a better understanding of how exemptions for specific market participants and thus the distribution of burdens actually influence the acceptability of environmental policy measures among the general population. We report findings from a single-binary choice experiment embedded in a large-scale survey among a representative sample of 6,000 German household heads. Specifically, we consider both vertical equity measures, i.e. exemptions to low-income households to counter the regressivity of environmental policies (Cronin et al., 2019), as well as

industry exemptions. We particularly investigate how respondents' support for distributional policies depends on their individual economic consequences and fairness concerns. Specifically, we investigate the willingness to pay an increase of the levy that finances the promotion of renewable energies in Germany.

In spirit of Portney's (2004) "Obligations of a policy economist", empirical evidence has emerged that establishes a link between the support of specific policies and process attributes (e.g. Johnston and Duke, 2007; Johnston et al., 1999). For instance, Almås et al. (2020) and Esarey et al. (2012) analyze the nexus between distributional policies and fairness perceptions, in particular when dealing with distributions across households. Yet, little is known about the determinants of the acceptance of specific policy measures with distributional impacts.[1] Rivers and Schaufele (2015), for instance, argue that the public acceptance of a newly introduced carbon tax was increased because of its revenue-neutrality, but they do not discuss distributional aspects. Cai et al. (2010) find that the willingness-to-pay (WTP) for climate mitigation depends on the perception of who should mainly be responsible for mitigation and who would be mostly affected. Andor et al. (2018) suggest that negative effects of industry exemptions on the acceptability of additional burden are consistent with fairness considerations.

We first document that potential exemption schemes do not lead to a lower support for the promotion of renewable energies in general, but rather it depends on who is exempted. While we replicate the finding of Andor et al. (2018) that industry exemptions have a stark negative effect on the support for the policy (henceforth, SP), exempting low-income households is viewed much more favorably. In fact, abolishing existing industry exemptions and instead exempting low-income households would strongly increase the SP. If industry exemptions are deemed indispensable from a policy perspective, our results suggest that providing additional exemptions for low-income households would even increase the average SP. We further show that income and thus the eligibility for the low-income exemption rule does not affect the result. Our findings thus establish a crucial link between the distribution of burdens and the po-

[1] There is a strongly growing literature, in particular on the determinants for support of a carbon tax (see, for example, Maestre-Andrés et al., 2019 for a review).

litical acceptability of the policy measure.

Importantly, the political support for exemptions can be linked with behavioral measures. By running participants through an independent experiment based on Engelmann and Strobel (2004) to elicit distributional preferences, we find that inequality aversion explains the support for household exemptions, but not for industry exemptions. The link between the experimental measure of inequality aversion does, however, depend on whether a participant benefits from the exemptions: for low-income households, it is consistent with them focussing on the reduction in total inequality that could be achieved through the exemptions, i.e. they prefer a less regressive policy. Conversely, for higher-income households, the measure is consistent with inequity aversion, i.e. the idea that everybody needs to bear the costs in a proportional manner.

Our results further indicate that the perceived fairness of policies is crucial: first, respondents who think that exemptions for households are fair react highly positively to such household exemptions as indicated by a particularly high SP. Second, household heads who perceive industry exemptions as fair reduce their support for the policy if industry exemptions are abolished. Moreover, we document that respondents who believe that poverty is self-inflicted reduce their SP when low-income households are excluded. Conversely, whether the respondent thinks that industry is source of affluence has no power in explaining the support for industry exemptions.

The remainder of the paper proceeds as follows. Section 2 describes the experimental design and Section 3 discusses the available data. Section 4 presents our results, before we conclude in Section 5.

2 Experimental design

We conducted a between-subject stated-choice experiment among more than 6,000 household heads in Germany using the representative household panel of the survey institute *forsa*. At the outset of the experiment, we provided a consequential script (Bulte et al., 2005), emphasizing that the study is part of a research project funded by

a federal ministry. Moreover, we highlighted that the study would be made available to political decision-makers.[2]

Just before the choice experiment, we provided the following general information: "*The promotion of renewable energies has led to the installation of around 104 gigawatts of renewable energies and to a share of 32 percent of electricity that is generated from renewable energies. The German government aims to increase the share of electricity generated from renewable energies to 80 percent by 2050. The promotion of renewable energies in Germany is financed by the so-called EEG levy. This levy is charged per unit of electricity consumed (kWh) by each household customer and amounts to 6.79 cents/kWh in 2018. Since the average electricity price for household customers is around 29.2 cents/kWh, this corresponds to a share of around 28 percent (including VAT on the levy).*"

The participants were randomly split into eight experimental groups (see Table 1) and asked a single binary question on their willingness to pay a higher EEG-levy per kWh. While we do not specifically interpret the answer as willingness to pay a specific (absolute) monetary amount, but rather to support a given policy (SP) that incorporates an increased price, we opted for this design as it has been shown to be incentive compatible under certain conditions when dealing with the provision of a public good (Carson and Groves, 2007; Carson et al., 2014).[3] Specifically, we asked the following question in the *Control Group*: "*Are you willing to pay an increase in the EEG-levy*

[2]The exact wording of the consequential script and further survey questions that were asked after the experiment as well as the coding of the responses can be found in Appendix I.

[3]For an impure public good, such as green electricity, single binary choice formats are incentive compatible under three conditions (Carson and Groves, 2007) that are all fulfilled for our empirical example. We consider (1) only one public good, (2) the government can actually provide the public good and compel everyone to pay and (3) only potential users are interviewed. In addition, the literature has emphasized the importance of "consequentiality" for incentive compatibility (Carson and Groves, 2007; Vossler et al., 2012; Zawojska et al., 2019), which we address through two proposed approaches. We provide an ex-ante consequential script (Bulte et al., 2005) and elicit ex post the political consequentiality of our study (Vossler and Watson, 2013). Specifically, after the experiment, we asked respondents how likely they thought the results of this study would influence policymakers in deciding on the EEG levy. Restricting the sample to respondents who deem the survey consequential (in the vein of Herriges et al., 2010) does not change the results in qualitative terms. Specifically, the sample is restricted to respondents who report that it is not unlikely (values 2-5 on five-point Likert scale) that future policy decisions can be influenced by the results of the survey. Table A1 shows the results of our main research questions (Table 5) using the restricted sample. As a further robustness check, we also use an alternative, more stringent definition of political consequentiality where consequentiality is coded as unity if the respondent answered 4 or 5 on the five-point Likert scale. The results displayed in Table A2 are qualitatively the same but more imprecisely estimated because of the smaller sample size.

by x ct/kWh to achieve the goal of increasing the share of renewable energies by 10 percentage points?", randomly assigning $x \in \{1, 2, 4\}$. Across the seven other experimental groups, we vary the information on the exemptions for either the energy-intensive industry or low-income households and measure the impact on the acceptance rate for a higher levy. For our specific policy application, the status quo in Germany includes industry exemptions, while low-income households are not exempt.

Experimental groups II, II', III, and III' deal with the exemptions for the energy-intensive industry and received the following additional information: "*About 4% of industrial companies, which consume about 40% of the industrial electricity, do not have to pay the full amount of the levy*". Two of these four groups (II' and III') additionally received information on the justification of the exemption, "*This exemption is intended to shield companies, so as not to undermine their international competitiveness*". Afterwards, we asked the particpants whether they are willing to pay an increase in the EEG-levy by x ct/kWh ($x \in \{1, 2, 4\}$) given that the exemptions are retained (II and II') or abolished (III and III').

Table 1: Summary of Experimental Design

		Industry				Households		
	I	II	II′	III	III′	IV	V	VI
	Control	Exempt_{IND}	$\text{Exempt}_{IND,J}$	NotExempt_{IND}	$\text{NotExempt}_{IND,J}$	Exempt_{HH}	NotExempt_{HH}	Exempt_{Both}
Provided Information								
Existing exemptions	–	✓	✓	✓	✓	–	–	✓
International competitiveness	–	–	✓	–	✓	–	–	–
Household cost	–	–	–	–	–	✓	✓	✓
Overview of research questions								
Addressed issue	Experimental Groups			Research Question				
Overall Effects	*I* & *III* *I* & *IV* *I*, & *VI*			Abolishing the industry exemptions increases the SP Exempting low-income households reduces the SP Combining exemptions further reduces the SP				
Fairness	*II* & *III* *IV* & *V*			Abolishing the industry exemptions increases the SP (all informed) Exempting low-income households reduces the SP (all informed)				
Information	*I* & *II* *I* & *V* *IV* & *VI*			Informing about the industry exemptions reduces the SP Informing about the household cost reduces the SP Informing about the industry exemptions reduces the SP (given HH exemptions)				
Justification	*II* & *II′* and *III* & *III′*			Providing reasons for industry exemptions increases the SP				

Treatment groups IV, V, and VI received information on the costs that the promotion of renewable energies implies for households in different income groups. Specif-

ically, we informed the participants that "*The promotion of renewable energies via the levy on average causes the following annual costs: Households with a monthly income below 1200 Euro pay 157 Euro, households with an income between 1200 and 2700 pay 198 Euro, households with an income between 2700 and 4200 pay 266 Euro, and households with an income larger than 4200 pay 284 Euro*". These average numbers for the respective income categories were calculated from an earlier survey, which elicited detailed billing information and socioeconomic characteristics from several thousand households (see Frondel et al., 2015 for more information). The promotion costs increase with income along with the increasing electricity consumption (e.g. Davis, 2008).

Participants are then asked to state whether they are willing to support an increase in the EEG-levy given that exemptions for low-income households ($<$ 1200 Euro) are implemented (IV) or not implemented (V). Treatment VI combines the information on industry exemptions (without mentioning the reason) and on household cost for the promotion of renewable energies to assess the willingness to support an increase in the EEG-levy conditional on retaining industry exemptions and exempting low-income households.

This experimental design allows us to address several research questions, as illustrated in the lower panel of Table 1. Our central question (*Overall Effects*) addresses how the distribution of costs affects the political support for regulatory measures, i.e. the support for the promotion of green electricity. We then disentangle the mechanisms affecting the support, specifically addressing the importance of fairness considerations and information. On the one hand, exemptions for particular groups in society may conflict with *fairness* perceptions in the population. We investigate if exemptions are generally seen as negatively or viewed differently when applied to low-income households alone or in combination with industry exemptions. On the other hand, providing *information* on the details of policy measures may be seen as a prerequisite of good governance. We explore how information on existing industry exemptions or on the costs for households affect the political support. Additionally, we investigate if the SP changes when *justifications* for specific measures are provided

by communicating reasons for the existence of industry exemptions.

We combine the observations in our treatments with detailed survey data that is presented in the next section. With this, we can test a variety of heterogeneous treatment effects. To this end, we exploit information on the preference for equality, the perceived fairness of the industry and household exemptions, respectively, as well as attitudes toward the industry and poverty.

3 Data

Our experiment was embedded in a large-scale survey for which we collaborated with the survey institute *forsa*. *forsa* maintains a panel of more than 80,000 households that is representative of the German-speaking population aged 14 and above (information on the panel is available at `http://www.forsa.com/`). The panel is recruited exclusively offline (via telephone), so that each household has the same selection probability. We pre-tested the questionnaire among 164 members of *forsa*'s subject pool on July 27, 2018. Subsequently, we invited 9,134 subjects to take part in the survey between August 1 and September 11. Of those, 6,923 initiated the survey, yielding a response rate of roughly 75%, which is comparable to other studies that use *forsa's* household panel (e.g. Andor et al., 2020). Panelists could interrupt and continue the survey at any time. The median response time was about 28 minutes.

Prior to the experiment, 270 respondents quit the survey. The dropout rate of about 4% is relatively low and comparable to other studies that use *forsa*'s household panel (e.g., Andor et al., 2018). Table 2 summarizes the main socioeconomic variables separated by treatment group. The socioeconomic characteristics are well balanced across the groups and we cannot detect any statistically significant differences at the 5% level.

Subsequent to the experiment, we gathered a set of attitudes related to the link between fairness and the support for the promotion of renewable energies. We measure environmental concern via a variant of the Diekmann and Preisendörfer (2003) scale, which we normalized to unity. We use four of the nine original questions, covering

all three spheres of the scale – affective, cognitive, and conative. Our shorter version of the scale yields a Cronbach's (1951) Alpha of $\alpha = 0.758$, which is very similar to the mean Alpha for measuring attitudes in Peterson's (1994) meta analysis. For the purpose of the regression analyses, we standardize this measure by substracting the sample mean and dividing to its standard deviation.

Table 2: Descriptive Statistics across Experimental Conditions

			Industry				Households		
		I	II	II′	III	III′	IV	V	VI
		Control	Exempt_{IND}	$\text{Exempt}_{IND,J}$	NotExempt_{IND}	$\text{NotExempt}_{IND,J}$	Exempt_{HH}	NotExempt_{HH}	Exempt_{Both}
Variable	Variable description								
Socioeconomic characteristics									
Age	Age of respondent in years	55.909	55.390	55.688	55.981	55.516	55.708	55.285	55.876
		(0.550)	(0.533)	(0.551)	(0.546)	(0.545)	(0.555)	(0.556)	(0.530
Female	Dummy: 1 if respondent is female	0.420	0.422	0.433	0.430	0.419	0.430	0.444	0.416
		(0.017)	(0.017)	(0.018)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017
College	Dummy: 1 if respondent holds	0.260	0.264	0.252	0.251	0.267	0.265	0.262	0.251
	college degree	(0.015)	(0.016)	(0.015)	(0.015)	(0.016)	(0.016)	(0.015)	(0.015
Children	Dummy: 1 if there are	0.607	0.636	0.630	0.613	0.617	0.596	0.639	0.612
	children in household	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017
Homeowner	Dummy: 1 if household	0.541	0.543	0.557	0.570	0.586	0.568	0.557	0.567
	owns property	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017
Income	Net monthly household income	2,852.311	2,850.489	2,872.779	2,837.174	2,952.468	2,898.682	2,907.223	2,849.310
	in Euro	(50.494)	(51.252)	(51.289)	(50.885)	(52.490)	(50.131)	(50.581)	(49.601
East	Dummy: 1 if household	0.247	0.289	0.269	0.270	0.280	0.237	0.274	0.280
	resides in East Germany	(0.015)	(0.016)	(0.016)	(0.015)	(0.016)	(0.015)	(0.015)	(0.015
Attitudes									
Environmental	Normalized value on the	0.751	0.748	0.749	0.757	0.750	0.754	0.760	0.754
concern	Diekmann and Preisendörfer (2003) scale	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
Inequality	Dummy: 1 if respondent chooses	0.394	0.352	0.390	0.364	0.364	0.338	0.373	0.366
aversion	equal distributions in allocation games	(0.019)	(0.018)	(0.019)	(0.018)	(0.019)	(0.018)	(0.018)	(0.018)
Fair industry	Dummy: 1 if respondent deems	0.065	0.077	0.081	0.078	0.091	0.063	0.079	0.070
	industry exemptions fair	(0.009)	(0.010)	(0.010)	(0.009)	(0.010)	(0.009)	(0.010)	(0.009)
Fair household	Dummy: 1 if respondent deems	0.643	0.600	0.596	0.580	0.588	0.547	0.602	0.555
	household exemptions fair	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.018)	(0.017)	(0.017)
Affluence	Dummy: 1 if respondent thinks	0.683	0.716	0. 0.713	0.705	0.721	0.690	0.731	0.695
	that industry is source of affluence	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Poverty	Dummy: 1 if respondent thinks	0.071	0.093	0. 0.079	0.120	0.103	0.088	0.114	
	that poverty is own responsibility	(0.009)	(0.010)	(0.011)	(0.009)	(0.011)	(0.011)	(0.010)	(0.011)
	Number of observations	826	818	813	837	835	839	832	853

Note: Standard errors are reported in parentheses. The values on the Diekmann and Preisendörfer (2003) scale run between 0 and 1. This index is constructed from adding the answers to four questions on a five-point Likert-scale and dividing by the maximum (20).

To analyze the role of fairness preferences, we borrow from Engelmann and Strobel (2004) and confronted participants with an allocation game. In three rounds, we asked participants to choose one of three distributions across three persons, being Person 2 (see Table 3). In each round, Distribution A exhibits the highest total amount, while Distribution C is the most equal distribution, yielding a trade-off between efficiency and equality. The absolute amount for Person 2 is constant across the three distributions, merely the relative position varies: while Person 2 receives the median amount in Round I, Person 2 is at the bottom and top of the distribution in Round II and Round III, respectively.

We consider respondents to behave inequality averse if they choose Distribution C in all three games, which is the case for 37% of the respondents (Table 2). Respondents with the lowest incomes (less than €1200) tend to be more inequality averse than respondents with higher incomes, conditional on other covariates (Table A4). Note that these questions were not incentivized.

We additionally elicited attitudes towards poverty, i.e. if respondents believe that "poverty is self-inflicted" (Benabou and Tirole, 2006). This statement is supported by around 10% of the respondents (Table 2) and receives higher support among higher income categories (Table A4).

Table 3: Allocation Games

	Round I			Round II			Round III		
	A	B	C	A	B	C	A	B	C
Person 1	21	17	13	14	11	8	11	8	5
Person 2	9	9	9	4	4	4	12	12	12
Person 3	3	4	5	5	6	7	2	3	4
Sum	33	30	27	23	21	19	25	23	21
Choices (%)	7.70	31.09	61.21	8.91	32.72	58.37	16.17	36.76	46.97

Moreover, we asked respondents about the perceived fairness of exemptions for the industry and low-income households, respectively. The descriptive results in Table 2 show that only 7.6% of the respondents deem the industry exemptions fair, while about 60% of the respondents believe that exemptions for low-income households are fair (Table 2). We also elicited attitudes towards the industry and find that about 70% of the respondents think that the "industry is the source of affluence in our society".

Table 2 suggests that the distributions of the attitudes slightly differ across the treatment groups. To systematically test for differences in the distributions, we regress the attitudinal variables on the treatment indicators. Table A5 in the appendix illustrates that, for instance, the likelihood to report that the exemptions for low-income households are fair is lower in all groups than in the control group. By contrast, there is hardly any difference in the corresponding statement considering the industry exemp-

tions.

4 Results

4.1 Average treatment effects

Our dependent variable is a binary indicator that equals unity if a respondent is willing to pay an increase in the levy raised for the promotion of renewable energy and zero otherwise. Respondents who answered "I do not know" ($n = 665$) are excluded from the analysis. In addition, 33 individuals quit the survey at this stage of the questionnaire so that our final sample consists of 5,955 respondents. Table 4 summarizes the percentage of respondents who support the policy (SP), i.e. are willing to pay an increase in the EEG-levy, and shows, for example, that in the *Control Group* (Column I) 61% of the respondents who were confronted with a raise of 1 ct/kWh are willing to pay it.

Table 4: Support for the policy (SP) that promotes renewable energies (Percentage of individuals willing to pay an increase in the EEG-levy by 1, 2 and 4 ct/kWh)

		Industry				Households		
	I	II	II′	III	III′	IV	V	VI
	Control	Exempt_{IND}	$\text{Exempt}_{IND,J}$	NotExempt_{IND}	$\text{NotExempt}_{IND,J}$	Exempt_{HH}	NotExempt_{HH}	Exempt_{Both}
1 ct/kWh	0.606	0.335	0.336	0.732	0.685	0.616	0.596	0.442
	(0.031)	(0.031)	(0.031)	(0.029)	(0.030)	(0.031)	(0.031)	(0.030)
2 ct/kWh	0.536	0.314	0.349	0.672	0.605	0.522	0.476	0.374
	(0.030)	(0.030)	(0.030)	(0.030)	(0.032)	(0.032)	(0.031)	(0.031)
4 ct/kWh	0.423	0.228	0.228	0.594	0.537	0.445	0.452	0.343
	(0.032)	(0.027)	(0.026)	(0.031)	(0.032)	(0.032)	(0.031)	(0.031)
Total	0.524	0.291	0.304	0.665	0.610	0.528	0.507	0.388
	(0.018)	(0.017)	(0.017)	(0.017)	(0.018)	(0.018)	(0.018)	(0.018)

Note: Standard errors are reported in parentheses.

As expected, the share declines with the size of the levy: in the *Control Group*, for example, increasing the levy from 1 ct/kWh to 4 ct/kWh reduces its acceptance rate by about 18 percentage points. Across all experimental conditions, we find large differences: the SP varies for an increase of 1 ct/kWh for the EEG levy between a support of 34% when notifying participants about existing industry exemptions (treatment II:

$Exempt_{IND}$) to 73% when abolishing them (treatment III: $NotExempt_{IND}$).

Our main result is that exemptions can have a massive effect on the SP, yet it strongly depends on who is exempted. These results are so stark that Table 4 already gives clear indications for our main hypotheses (*Overall Effects*). Informing about exemptions for the energy-intensive industry (treatment II) substantially reduces the SP relative to the control group,[4] while abolishing the exemptions (treatment III) increases political support. This replicates the main result of Andor et al. (2018). The big negative effect of informing about the continued exemption for the industry cannot be mitigated by communicating reasons for their existence (treatment II' vs II). Thus, our *justification* hypothesis is rejected. A t-test in groups II' and II (row total) indicates that the means are not statistically different from each other ($t = 0.527$; $p = 0.599$). Regarding the difference between groups III' and III, a t-test reveals that the difference between the two means of roughly 6.5 percentage points is statistically significant ($t = 2.20$; $p = 0.028$). Hence, overall, justifying exemptions for the industry by referring to international competitiveness moderates the positive effect of abolishing them.

Yet, our results reveal that the large effects of informing about or abolishing the exemptions are not driven by an ubiquitous aversion to exemptions: household exemptions are perceived much more favorably in comparison with industry exemptions. In fact, exempting low-income households (treatment IV) does not have an impact on the average SP relative to the control treatment. Similarly, just informing households on the relevant costs (treatment V) without providing exemptions also leaves the average SP unaffected. Moreover, starting from the current policy of exemptions for the industry, the additional introduction of exemptions for low-income households would lead to an increase in acceptance: the share of those who are willing to pay 1 ct/kWh increases from 34% ($Exempt_{IND}$) to 44% ($Exempt_{Both}$).

These findings thus suggest an important political economy story: policy mak-

[4]The comparison of treatments IV and VI shows that such information about existing industry exemptions reduces the SP also in presence of household exemptions ($t = 4.00; p < 0.001$) in the case of a 1 ct/kWh increase.

ers need to trade-off support for a more stringent policy measure with a desired distribution of burdens. In fact, even if exemptions for industry were indispensable for competitiveness reasons, providing additional exemptions for low-income households would generate a similar support for a levy of 4 ct/kWh ($Exempt_{Both}$) as without household exemptions for a 1ct/kWh levy ($Exempt_{IND,J}$). Through tailoring the distribution of costs, policy makers can thus substantially affect the support for policy measures, thereby opening the possibility for further strenghtening their stringency.

In our further analysis, we dive deeper into the drivers of these treatment effects on the support for policy measures. Importantly, we study if the treatment effects depend on socioeconomic characteristics, with a particular focus on income because it determines whether one benefits from household exemptions, or if the support for industry or household exemptions depends primarily on them being perceived as fair and justified. As the only purpose of groups II' and III' was to test the *justification* hypothesis, we exclude them from the following analysis.

We estimate a set of linear probability models (LPM):

$$Y_i = \beta + \sum_g \boldsymbol{\beta}_g^\top \boldsymbol{G}_i + \sum_l \boldsymbol{\beta}_l^\top \boldsymbol{L}_i + \boldsymbol{\beta}_x^\top \boldsymbol{X}_i + \varepsilon_i, \tag{1}$$

where Y_i is a binary indicator that takes the value one if respondent i is willing to support an increase in the levy for the promotion of renewable energy. $\boldsymbol{G}_i$ denotes the vector of indicators of the experimental groups and $\boldsymbol{L}_i$ is the vector of the increase in the levy, namely 2 and 4 Cents per kWh, with 1 Cent per kWh being the base category. Vector $\boldsymbol{X}_i$ denotes a set of control variables, $\boldsymbol{\beta}$ are the parameters to be estimated, and ε designates a random error term. In all our regressions, we use the control group as the base category. We exclude treatments II' and III' as providing a justification for industry exemptions generates only small effects compared to groups II and III, respectively.

The binary nature of our dependent variables generally calls for the application of a nonlinar model, such as logit or probit. We nevertheless opt for estimating a

LPM in our main specifications because of the easier interpretation of the coefficients, in particular when interaction terms are included (Ai and Norton, 2003). Moreover, Angrist and Pischke (2009) advocate for using LPMs instead of nonlinear models that require distributional assumptions. Yet, applying LPMs in this context can have some shortcomings, e.g. that probabilties are not bounded in the unit interval (Horrace and Oaxaca, 2006). As a robustness check, we therefore estimate all specifications using a probit model and find that all results hold up qualitatively. The results of the probit models of the specifications displayed in Table 5 are reported in Table A6 in the appendix.

Table 5: Effect of various exemptions on the SP

	(I)		(II)	
	Coeff.	Std. Err.	Coeff.	Std. Err.
Exempt_{IND}	-0.232***	(0.025)	-0.240***	(0.026)
NotExempt_{IND}	0.141***	(0.025)	0.144***	(0.026)
Exempt_{HH}	0.004	(0.026)	0.011	(0.026)
NotExempt_{HH}	-0.016	(0.026)	-0.020	(0.026)
Exempt_{Both}	-0.135***	(0.025)	-0.131***	(0.027)
2 ct/kWh	–	–	-0.072***	(0.018)
4 ct/kWh	–	–	-0.144***	(0.019)
Children	–	–	-0.018	(0.017)
Homeowner	–	–	-0.021	(0.017)
Income 1200-2700	–	–	0.002	(0.028)
Income 2700-4200	–	–	0.026	(0.030)
Income $>$ 4200	–	–	0.073**	(0.032)
College degree	–	–	0.099***	(0.018)
East Germany	–	–	-0.098***	(0.018)
Female	–	–	0.038**	(0.016)
Age	–	–	-0.001*	(0.001)
Environmental concern	–	–	0.098***	(0.007)
Constant	0.524***	(0.018)	0.648***	(0.043)
No. of observations	4,483		3,795	

Note: SP = Support for the policy. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1 %, 5 %, and 10% level, respectively.

Specification (I) in Table 5 shows that the currently applied policy of industry exemptions ($Exempt_{IND}$) exhibits a significantly lower acceptance rate compared to all other policies. In line with our discussion above, informing participants about industry exemptions strongly reduces the the probability of accepting a higher levy by 23 percentage points ($Exempt_{IND}$), while abolishing exemptions increases it by

14 percentage points, relative to the control group. When both low-income households and the industry are exempted, respondents are on average around 10 (23.2-13.5) percentage points more likely to be willing to pay an increase in the fixed surcharge per kilowatt hour than those who are in the industry exempted group ($F(1,\ 3771) = 10.1;\ p = 0.001$).

Exempting households with low incomes ($Exempt_{HH}$) instead of the industry yields a larger support to pay a higher levy. Yet, the support for household exemptions is indistinguishable from the support in both the control group and when participants are just informed about households cost ($NotExempt_{HH}$, F(1,4477)=0.63; p=0.429). We therefore find a strong contrast between the two types of exemptions: While industry exemptions are consistenly opposed to, exemptions for households are seen as neutral or even positive when combined with exemptions for industry. The results also hold when controlling for socioeconomic characteristics and environmental concerns (Specification (II) in Table 5).

The coefficient estimates for the socioeconomic characteristics indicate that high-income households (>€4200) have a seven percentage points higher willingness to bear promotion costs for renewable energy than those with an income below €1200 (Table 5). In addition, the results show that SP is higher among better educated, female, and environmentally concerned household heads, while it is lower among households residing in East Germany.

4.2 Exploratory heterogeneity analysis

In the following, we conduct an exploratory analysis to learn more about the drivers for the heterogenous effects. Beyond the average support for different policy designs, it is important to observe which socioeconomic groups are sensitive to the changes in policy design. In particular, we differentiate by income groups: we expect interaction between income and experimental treatments depending on whether participants benefit from exemptions. To this end, we augment the regression equation

by an interaction term of the group variables G and the respective covariate and estimate the resulting LPM, while controlling for the same covariates as in Table 5 (*Further variables* in the regression tables).

We find that individuals in high-income households (>€4200) have a notably higher probability to accept a higher levy in the control group (Table 6) than those with an income below €1200. This difference is reduced in all experimental conditions. Exemptions for low-income households ($Exempt_{HH}$) generate a larger support among all income groups in comparison to only exempting the industry, the difference in support is strongest among respondents who would benefit from this policy (income <€1200) and weakest for the most affluent households with incomes >€4200 (see Figure 1).[5] Yet, a similar difference is found for the policy that does not exempt low-income households ($Exempt_{HH}$). Noting that $Exempt_{HH}$, $NotExempt_{HH}$ and $Exempt_{Both}$ all provide information on the costs for households, the relatively negative reaction by high-income households rather seems to be driven by the information about their predicted costs rather than equity considerations.

While differential effects for introducing household exemptions are of interest to policymakers who want to generate a larger average support for their policy among their constituency, it is of academic interest to better understand the behavioral mechanisms behind the support of exemptions. Exemptions for industry and households affect the distribution of burdens and thus may interact with attitudes towards inequality and fairness.

We concentrate on four different measures: First, we consider if inequality aversion matters for accepting exemptions for low-income households. Second, we analyze the effects of attitudes toward poverty, i.e. if respondents believe that "poverty is self-inflicted" (Benabou and Tirole, 2006). Third, we study if the perceived fairness of the respective exemptions plays a role. Last, we investigate whether the acceptance of exemptions is affected by the respondent's views on industry as being a source of

[5] Relative to the control group, exempting low-income households increases the support for a higher levy by 14 percentage points in the lowest income group ($F(1, 3762) = 2.81;\ p = 0.09$) and reduces it by 11 percentage points in the highest income group ($F(1, 3762) = 4.99;\ p = 0.03$).

Table 6: Effects of interaction between exemptions and income on the SP

	Coeff.	Std. Err.
Exempt_{IND}	-0.212***	(0.082)
NotExempt_{IND}	0.119	(0.084)
Exempt_{HH}	0.139*	(0.083)
NotExempt_{HH}	0.077	(0.086)
Exempt_{Both}	0.060	(0.084)
Income 1200-2700	0.068	(0.064)
Income 2700-4200	0.072	(0.066)
Income $>$ 4200	0.234***	(0.070)
Exempt_{IND} $\times$ Income 1200-2700	-0.007	(0.092)
Exempt_{IND} $\times$ Income 2700-4200	-0.008	(0.094)
Exempt_{IND} $\times$ Income $>$4200	-0.128	(0.101)
NotExempt_{IND} $\times$ Income 1200-2700	0.035	(0.094)
NotExempt_{IND} $\times$ Income 2700-4200	0.081	(0.096)
NotExempt_{IND} $\times$ Income $>$4200	-0.080	(0.101)
Exempt_{HH} $\times$ Income 1200-2700	-0.144	(0.093)
Exempt_{HH} $\times$ Income 2700-4200	-0.078	(0.094)
Exempt_{HH} $\times$ Income $>$4200	-0.253**	(0.101)
NotExempt_{HH} $\times$ Income 1200-2700	-0.075	(0.095)
NotExempt_{HH} $\times$ Income 2700-4200	-0.109	(0.097)
NotExempt_{HH} $\times$ Income $>$4200	-0.177*	(0.104)
Exempt_{Both} $\times$ Income 1200-2700	-0.204**	(0.095)
Exempt_{Both} $\times$ Income 2700-4200	-0.162*	(0.096)
Exempt_{Both} $\times$ Income $>$4200	-0.333***	(0.103)
Constant	0.582***	(0.065)
No. of observations	3,795	
Further variables	Yes	

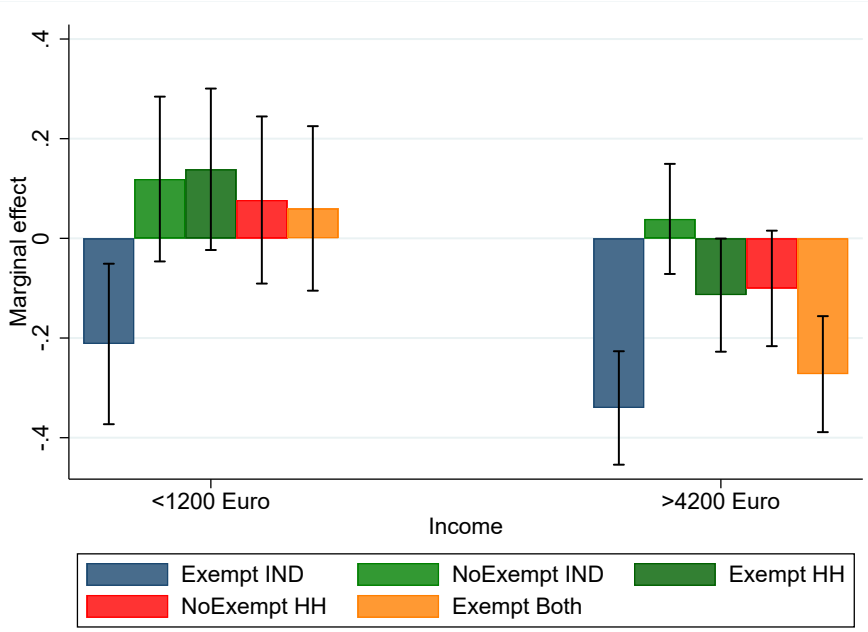
Note: SP = Support for the policy. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1 %, 5 %, and 10% level, respectively. *Further variables* comprise the following variables as denoted in Table 2: *age, female, college, children, homeowner, east, environmental concern*, and the EEG levy.

affluence.[6]

We find that inequality aversion on average reduces the acceptance rate of higher promotion costs in the presence of household exemptions, i.e. both in $Exempt_{HH}$ and $Exempt_{Both}$. This is indicated by the negative interaction effects in the first panel "All" in Table 7. In fact, among inequality averse participants, household exemptions lead to a significantly reduced SP relative to the control group as well as to just informing participants about households cost in $NotExempt_{HH}$. Further splitting by income

[6]In the following, we will analyze all these questions separately. As one reviewer pointed out, this procedure might cause biases owed to omitted variables. Therefore, we estimate a model that includes all interaction effects we are interested in. It is documented in Table A7 and sustains the conclusions drawn from the models presented in the main text. For sake of readability, we prefer to display these separately.

Figure 1: Treatment effects for income groups <€1200 and >€4200.



Note: The dependent variable is a binary indicator that is unity if the respondents are willing to pay a higher levy for a larger share of renewable energy. Thus, the height of the bars indicates the effect on support in percentage points in the treatment groups compared to the control group. The whiskers represent the 95% confidence interval.

categories (Panel "Not benefitting" and "Benefitting" in Table 7), we detect that this effect is driven by more affluent respondents, i.e. those who would not benefit from the household exemptions.[7]

This difference in how inequality aversion impacts the support for household exemptions is noteworthy. For low-income households, it is consistent with them focussing on the reduction in total *inequality* that could be achieved through the exemptions. Instead, for rich inequality averse households, it is consistent with *inequity* aversion, i.e. the idea that all should bear costs in a proportional manner. We note that the measure of inequality aversion has bite only for explaining attitudes towards household exemptions, but not for industry exemptions.

[7]The smaller sample size for the benefitting group reduces the power and precision of estimates. While still allowing for statistical inference, the results on interaction effects need to be interpreted cautiously.

Table 7: Effect of inequality aversion on the SP by income group

	All		Not benefitting >€1200		Benefitting <€1200	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Exempt_{IND}	-0.226***	(0.036)	-0.244***	(0.037)	-0.076	(0.130)
NotExempt_{IND}	0.157***	(0.035)	0.149***	(0.036)	0.212*	(0.123)
Exempt_{HH}	0.035	(0.035)	0.028	(0.037)	0.090	(0.122)
NotExempt_{HH}	-0.006	(0.037)	-0.029	(0.038)	0.224*	(0.133)
Exempt_{Both}	-0.087**	(0.037)	-0.125***	(0.039)	0.276**	(0.123)
Inequality aversion	0.013	(0.040)	0.001	(0.042)	0.132	(0.133)
Exempt_{IND} × Inequality aversion	-0.071	(0.056)	-0.044	(0.059)	-0.308	(0.189)
NotExempt_{IND} × Inequality aversion	-0.050	(0.057)	-0.022	(0.059)	-0.285	(0.192)
Exempt_{HH} × Inequality aversion	-0.167***	(0.058)	-0.212***	(0.061)	0.073	(0.182)
NotExempt_{HH} × Inequality aversion	-0.051	(0.058)	-0.032	(0.061)	-0.293	(0.198)
Exempt_{Both} × Inequality aversion	-0.161***	(0.058)	-0.128**	(0.061)	-0.447**	(0.190)
Constant	0.703***	(0.043)	0.721***	(0.044)	0.631***	(0.148)
Further variables	Yes		Yes		Yes	
No. of observations	3,308		2,992		316	

Note: SP = Support for the policy. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1 %, 5 %, and 10% level, respectively. *Further variables* comprise the following variables as denoted in Table 2: *age, female, college, children, homeowner, east, environmental concern,* and the EEG levy.

Considering attitudes towards poverty (Table 8), we find that household heads who think that poverty is self-inflicted exhibit a lower SP when coupled with household exemptions relative to when just informing about the cost ($F(1, 3760) = 8.52$; $p = 0.04$). Panel "Not benefitting" in Table 8 indicates that this effect is particularly driven by households who do not benefit from exemptions: they support household exemptions ($Exempt_{HH}$) relative to ($NotExempt_{HH}$) if they do not see poverty as self-inflicted ($F(1, 3406)$; $p = 0.06$), while the reverse comparison holds if they do ($F(1, 3406)$; $p = 0.005$). Among households that benefit from exemptions, only 5% see poverty as self-inflicted. Consequently, views on poverty being self-inflicted do not turn out to be statistically significant for this low-income group despite the large magnitude of the respective coefficient $Exempt_{HH} \times$ *Self-inflicted poverty*.

Table 8: Effect of self-inflicted poverty on the SP by income group

	All		Not benefitting >€1200		Benefitting <€1200	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Exempt_{IND}	-0.261***	(0.027)	-0.267***	(0.028)	-0.207**	(0.086)
Not exempt_{IND}	0.144***	(0.027)	0.143***	(0.028)	0.140	(0.089)
Exempt_{HH}	0.019	(0.028)	-0.000	(0.029)	0.161*	(0.086)
Not exempt_{HH}	-0.036	(0.027)	-0.051*	(0.029)	0.094	(0.091)
Exempt_{Both}	-0.136***	(0.028)	-0.166***	(0.030)	0.119	(0.090)
Self-inflicted poverty	-0.138**	(0.065)	-0.170***	(0.065)	0.229	(0.301)
Exempt_{IND} × Self-inflicted poverty	0.241***	(0.089)	0.259***	(0.091)	-0.114	(0.369)
Not exempt_{IND} × Self-inflicted poverty	-0.016	(0.093)	0.015	(0.094)	-0.867***	(0.303)
Exempt_{HH} × Self-inflicted poverty	-0.048	(0.089)	-0.008	(0.091)	-0.499	(0.360)
Not exempt_{HH} × Self-inflicted poverty	0.210**	(0.091)	0.247***	(0.091)	0.000	(.)
Exempt_{Both} × Self-inflicted poverty	0.086	(0.088)	0.134	(0.090)	-0.342	(0.385)
Constant	0.703***	(0.038)	0.715***	(0.039)	0.623***	(0.127)
Further variables	Yes		Yes		Yes	
No. of observations	3,782		3,402		380	

Note: SP = Support for the policy. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1 %, 5 %, and 10% level, respectively. There are no individuals in the Not $\text{exempt}_H H$ group who would benefit from household exemptions and state that poverty is self-inflicted. Therefore, the model fails to estimate the respective coefficient. *Further variables* comprise the following variables as denoted in Table 2: *age*, *female*, *college*, *children*, *homeowner*, *east*, *environmental concern*, and the EEG levy.

The above discussion on how behavioral attitudes correlate with views on exemptions relies on validated measures of inequality aversion and perceptions of individual responsibility for poverty. It is insightful that these measures have explanatory power even though they are elicited outside the context of the specific policy application.

Table 9: Effect of perceived fairness of household exemptions on the SP by income group

	All		Not benefitting >€1200		Benefitting <€1200	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
$Exempt_{IND}$	-0.178***	(0.042)	-0.173***	(0.043)	-0.177	(0.183)
$Not\ exempt_{IND}$	0.177***	(0.042)	0.193***	(0.043)	0.022	(0.173)
$Exempt_{HH}$	-0.196***	(0.040)	-0.185***	(0.042)	-0.244	(0.165)
$Not\ exempt_{HH}$	-0.019	(0.043)	-0.013	(0.044)	0.022	(0.176)
$Exempt_{Both}$	-0.229***	(0.041)	-0.225***	(0.042)	-0.221	(0.168)
Fair household exemptions	0.073*	(0.038)	0.107***	(0.040)	-0.223*	(0.129)
$Exempt_{IND}$ × Fair househ. exempt	-0.101*	(0.053)	-0.115**	(0.055)	-0.014	(0.210)
$Not\ exempt_{IND}$ × Fair househ. exempt.	-0.052	(0.053)	-0.073	(0.055)	0.143	(0.200)
$Exempt_{HH}$ × Fair househ. exempt	0.366***	(0.051)	0.344***	(0.054)	0.500***	(0.191)
$Not\ exempt_{HH}$ × Fair househ. exempt	-0.002	(0.054)	-0.026	(0.057)	0.080	(0.204)
$Exempt_{Both}$ × Fair househ. exempt	0.174***	(0.054)	0.134**	(0.056)	0.432**	(0.195)
Constant	0.656***	(0.044)	0.644***	(0.046)	0.746***	(0.138)
Further variables	Yes		Yes		Yes	
No. of observations	3,773		3,394		379	

Note: SP = Support for the policy. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1 %, 5 %, and 10% level, respectively. *Further variables* comprise the following variables as denoted in Table 2: *age, female, college, children, homeowner, east, environmental concern,* and the EEG levy.

We finally turn to the question how the willingness to support a specific policy is linked to its perceived fairness. Our results indicate that respondents who think that exemptions for households are fair increase their SP strongly if household exemptions were implemented: for them, such exemptions substantially increase the likelihood of accepting higher cost, as indicated by the interaction term $Exempt_{HH}$ × *Fair househ. exempt* (Table 9). This effect is smaller when the policy also includes exemptions for the industry (17.4 instead of 36.6 percentage points). The interaction effects are similar across the income groups (Panels "Not benefitting" and "Benefitting" in Table 9), even though it is noteworthy that the effects seem to be particularly strong among those who benefit from the policy. For them, the combination with industry exemptions does not strongly change their perception compared to household exemptions alone. This suggests that for low-income households the focus is on the distribution of burdens across households.

Fairness perceptions on industry exemptions have similar explanatory power (Table 10). Respondents who perceive these exemptions as fair, increase their SP when

these exemptions are made more salient in $Exempt_{IND}$ and $Exempt_{BOTH}$ and instead reject their abolition in $NotExempt_{IND}$. By contrast, respondents who deem industry exemptions as unfair decrease their SP strongly when these are applied. We finally note that the respondents' views on industry being a source of affluence generally does not have any power in explaining the SP (Table 11).

Table 10: Effect of perceived fairness of industry exemptions on the SP by income group

	All		Not benefitting >€1200		Benefitting <€1200	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
$Exempt_{IND}$	-0.264***	(0.026)	-0.272***	(0.028)	-0.198**	(0.084)
$NotExempt_{IND}$	0.157***	(0.027)	0.161***	(0.028)	0.117	(0.089)
$Exempt_{HH}$	0.020	(0.027)	0.003	(0.029)	0.154*	(0.087)
$NotExempt_{HH}$	-0.019	(0.027)	-0.029	(0.029)	0.067	(0.094)
$Exempt_{Both}$	-0.140***	(0.028)	-0.167***	(0.029)	0.100	(0.089)
Fair industry exemptions	0.138**	(0.069)	0.124*	(0.070)	0.425***	(0.096)
$Exempt_{IND}$ × Fair ind. exemp.	0.280***	(0.099)	0.296***	(0.100)	0.000	(.)
$NotExempt_{IND}$D × Fair ind. exemp.	-0.220**	(0.097)	-0.224**	(0.098)	-0.328	(0.336)
$Exempt_{HH}$ × Fair ind. exemp.	-0.166	(0.104)	-0.119	(0.107)	-0.756***	(0.231)
$NotExempt_{HH}$ × Fair ind. exemp.	-0.060	(0.099)	-0.069	(0.103)	-0.261	(0.236)
$Exempt_{Both}$ × Fair ind. exemp.	0.103	(0.100)	0.139	(0.102)	-0.463	(0.338)
Constant	0.681***	(0.037)	0.692***	(0.038)	0.619***	(0.123)
Further variables	Yes		Yes		Yes	
No. of observations	3,763		3,384		379	

Note: SP = Support for the policy. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1 %, 5 %, and 10% level, respectively. *Further variables* comprise the following variables as denoted in Table 2: *age, female, college, children, homeowner, east, environmental concern,* and the EEG levy.

Table 11: Effect of perceived affluence on the SP by income group

	All		Not benefitting >€1200		Benefitting <€1200	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Exempt_{IND}	-0.258***	(0.046)	-0.282***	(0.050)	-0.139	(0.114)
NotExempt_{IND}	0.178***	(0.048)	0.164***	(0.052)	0.251**	(0.125)
Exempt_{HH}	0.035	(0.048)	0.003	(0.052)	0.204*	(0.122)
NotExempt_{HH}	-0.071	(0.049)	-0.100*	(0.053)	0.123	(0.151)
Exempt_{Both}	-0.213***	(0.048)	-0.258***	(0.052)	0.067	(0.134)
Affluence	0.058	(0.040)	0.036	(0.043)	0.169	(0.117)
$\text{Exempt}_{IND} \times$ Affluence	0.027	(0.055)	0.052	(0.060)	-0.098	(0.171)
$\text{NotExempt}_{IND} \times$ Affluence	-0.048	(0.057)	-0.024	(0.060)	-0.248	(0.173)
$\text{Exempt}_{HH} \times$ Affluence	-0.033	(0.057)	-0.008	(0.061)	-0.126	(0.169)
$\text{NotExempt}_{HH} \times$ Affluence	0.065	(0.058)	0.092	(0.062)	-0.099	(0.189)
$\text{Exempt}_{Both} \times$ Affluence	0.120**	(0.058)	0.149**	(0.062)	0.020	(0.175)
Constant	0.644***	(0.046)	0.670***	(0.049)	0.541***	(0.133)
Further variables	Yes		Yes		Yes	
No. of observations	3,784		3,404		380	

Note: SP = Support for the policy. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1 %, 5 %, and 10% level, respectively. *Further variables* comprise the following variables as denoted in Table 2: *age*, *female*, *college*, *children*, *homeowner*, *east*, *environmental concern*, and the EEG levy.

5 Summary and Conclusions

This study investigated how distributional aspects of environmental policy designs influence their political acceptability. We focus on exemptions from burdens arising from the costly policy measures as a specific distributional measure. Based on a large-scale survey of more than 6,000 German household heads, we test the effect of exemptions for both low-income households and energy-intensive industries.

Our results demonstrate that the support for exemptions as distributional policy measures depends on who is exempted. The willingness to support the policy that promotes renewable energies is much higher when low-income households are exempted rather than the energy-intensive industry. Furthermore, our results suggest that exemptions for low-income households, in addition to exemptions for industry, would actually increase support for the policy. If policymakers deem the currently existing industry exemptions indispensable, our results thus suggest that introducing

exemptions for low-income households would remarkably increase the acceptability of the environmental policy by about nine percentage points from 30 to 39%.

We thus identify a highly policy-relevant interaction between exemptions for specific groups and the acceptable stringency of the policy: identifying an appropriate burden distribution may not only improve the chances to implement a given policy, but also allow policymakers to strengthen the environmental target.

We further document that the views on exemptions are associated with behavioral attitudes. On average, inequality aversion reduces the acceptance of higher promotion costs in the presence of household exemptions, an effect that is driven by more affluent respondents, i.e. those who would not benefit from the household exemptions. Furthermore, we find that respondents who think that poverty is self-inflicted reduce their support for the policy when low- income households are exempted. It is noteworthy that these validated measures of inequality aversion and perception of individual responsibility for poverty are related to distributional preferences on renewable energy policies even though they are elicited outside the context of this specific application.

These and related behavioral measures may serve beneficial in identifying distributional concerns that govern the acceptability of environmental policies beyond our current application. While exploring their robustness is beyond the scope of this study, finding a fair burden distribution is of utmost importance to permit increasingly stringent policy targets.

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Appendix

I Wording of the experiment

Consequential script:
Now, we are interested in how much you are willing to pay for electricity generated with renewable energies. We will call this your willingness to pay.

We would like to point out that the study conducted here is part of a research project commissioned by the German Federal Ministry of Education and Research (BMBF). The results of this study will be made available to politicians and can serve as a basis for future decisions in energy policy. In order to arrive at sensible decisions, it is therefore important that you specify exactly the maximum amount that you are actually prepared to pay.

Question 1: How likely do you think is it that the results of surveys like this one will influence policy decisions regarding the level of the EEG levy? The respondents indicated the likelihood on a five-point scale, ranging from 1 "very unlikely" to 5 "very likely". We convert the responses into a binary indicator if the answer is 2 or higher, as proposed by Herriges et al. (2010).

Question 2: Currently, particularly energy-intensive companies are exempt from paying the EEG levy or pay a reduced levy per kWh consumed. What do you think of this regulation? The respondents indicated their level of agreement on a five-point Likert scale, ranging from 1 "do not agree at all" to 5 "completly agree". We convert the responses into a binary indicator (*Fair industry*) if the answer is 4 or 5.

Question 3: There are currently discussions about exempting low-income households (monthly net income below €1200) from paying the EEG levy. What would you think of this regulation? The respondents indicated their level of agreement on a five-point Likert scale, ranging from 1 "do not agree at all" to 5 "completly agree". We convert the responses into a binary indicator (*Fair household*) if the answer is 4 or 5.

Question 4: To what extent do you agree with the following statements?

- Industry is the source of affluence
- Poverty is self-inflicted

The respondents indicated their level of agreement on a five-point Likert scale, ranging from 1 "do not agree at all" to 5 "completly agree". We convert the responses into binary indicators (*Affluence* and *Poverty*) if the answers are 4 or 5.

II Tables

Table A1: Effect of various exemptions on the SP using the sample of respondents who deem the survey consequential

	(I)		(II)	
	Coeff.	Std. Err.	Coeff.	Std. Err.
Exempt_{IND}	-0.284***	(0.032)	-0.282***	(0.034)
NotExempt_{IND}	0.071**	(0.030)	0.086***	(0.031)
Exempt_{HH}	-0.044	(0.031)	-0.026	(0.032)
NotExempt_{HH}	-0.002	(0.031)	-0.001	(0.032)
Exempt_{Both}	-0.144***	(0.033)	-0.131***	(0.034)
2 ct/kWh	–	–	-0.079***	(0.023)
4 ct/kWh	–	–	-0.158***	(0.023)
Children	–	–	-0.036	(0.022)
Homeowner	–	–	-0.001	(0.022)
Income 1200-2700	–	–	0.010	(0.036)
Income 2700-4200	–	–	0.011	(0.037)
Income $>$ 4200	–	–	0.056	(0.040)
College degree	–	–	0.056***	(0.021)
East Germany	–	–	-0.092***	(0.023)
Female	–	–	0.013	(0.020)
Age	–	–	-0.001	(0.001)
Environmental concern	–	–	0.090***	(0.011)
Constant	0.665***	(0.022)	0.777***	(0.053)
No. of observations	2,692		2,348	

Note: SP = Support for the policy. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1 %, 5 %, and 10% level, respectively. The sample is restricted to respondents who report that it is not unlikely (values 2-5 on five-point Likert scale) that future policy decisions can be influenced by the results of the survey.

Table A2: Effect of various exemptions on the SP using the sample of respondents who deem the survey very consequential

	(I)		(II)	
	Coeff.	Std. Err.	Coeff.	Std. Err.
Exempt_{IND}	-0.310***	(0.071)	-0.271***	(0.076)
NotExempt_{IND}	-0.042	(0.067)	0.034	(0.072)
Exempt_{HH}	-0.071	(0.069)	0.005	(0.074)
NotExempt_{HH}	-0.039	(0.064)	0.010	(0.068)
Exempt_{Both}	-0.124*	(0.069)	-0.062	(0.075)
2 ct/kWh	–	–	-0.043	(0.052)
4 ct/kWh	–	–	-0.081	(0.054)
Children	–	–	-0.018	(0.050)
Homeowner	–	–	0.036	(0.049)
Income 1200-2700	–	–	0.065	(0.079)
Income 2700-4200	–	–	-0.017	(0.082)
Income $>$ 4200	–	–	0.057	(0.087)
College degree	–	–	0.157***	(0.049)
East Germany	–	–	-0.062	(0.054)
Female	–	–	-0.017	(0.046)
Age	–	–	-0.001	(0.001)
Environmental concern	–	–	0.070***	(0.025)
Constant	0.733***	(0.043)	0.716***	(0.112)
No. of observations	518		458	

Note: Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1 %, 5 %, and 10% level, respectively. The sample is restricted to respondents who report that it is likely (values 4-5 on five-point Likert scale) that future policy decisions can be influenced by the results of the survey.

Table A3: Comparison of our sample with the population of German households

Variable	Sample	Population
Age under 25 years	2.3%	4.6%
Age 25 – 64 years	64.3%	67.1%
Age 65 years and more	33.4%	28.3%
College degree	25.6%	21.8%
Female	42.7%	45.5%
Household size = 1	26.8%	41.9%
Household size = 2	48.2%	33.8%
Household size = 3	13.0%	11.9%
Household size = 4	12.0%	12.4%
East Germany	26.7%	20.6%
High income	12.7%	14.9%

Note: Population data is drawn from Destatis (2019). This data source asks the main earner to complete the questionnaire, whereas we ask the household member who usually makes the financial decisions for the household. Furthermore, the variable *High income* is top-coded at €4500, while in our sample, we set the threshold at €4200

Table A4: Determinants of attitudes

	Inequality aversion		Self-inflicted poverty		Fair household exemptions	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Children	0.054**	(0.022)	-0.002	(0.012)	-0.058***	(0.021)
Homeowner	0.007	(0.023)	0.040***	(0.012)	-0.068***	(0.021)
Income 1200-2700	-0.092**	(0.037)	0.022	(0.015)	-0.127***	(0.031)
Income 2700-4200	-0.053	(0.039)	0.046**	(0.018)	-0.126***	(0.033)
Income $>$ 4200	-0.063	(0.043)	0.038*	(0.020)	-0.129***	(0.037)
College degree	0.025	(0.024)	0.013	(0.014)	0.005	(0.022)
East Germany	0.047**	(0.024)	-0.019	(0.013)	-0.033	(0.022)
Female	-0.007	(0.021)	-0.011	(0.012)	0.002	(0.019)
Age	-0.002***	(0.001)	-0.003***	(0.000)	0.003***	(0.001)
Environmental concern	0.010	(0.010)	-0.023***	(0.007)	0.062***	(0.009)
Constant	0.485***	(0.050)	0.214***	(0.030)	0.615***	(0.046)
No. of observations	2,336		2,706		2,689	

Note: Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1 %, 5 %, and 10% level, respectively.

Table A5: Treatment Effect on Attitudes

	Environmental Concern		Inequality Averse		Fair Industry		Fair Households		Affluence		Poverty	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Exempt_{IND}	-0.004	(0.008)	-0.042	(0.026)	0.012	(0.013)	-0.044*	(0.024)	0.033	(0.023)	0.022	(0.014)
$\text{Exempt}_{IND,J}$	-0.003	(0.008)	-0.003	(0.026)	0.017	(0.013)	-0.048*	(0.024)	0.030	(0.023)	0.040***	(0.014)
NotExempt_{IND}	0.006	(0.008)	-0.030	(0.026)	0.013	(0.013)	-0.064***	(0.024)	0.022	(0.023)	0.008	(0.013)
$\text{NotExempt}_{IND,J}$	-0.001	(0.008)	-0.030	(0.026)	0.026**	(0.013)	-0.056**	(0.024)	0.038*	(0.023)	0.049***	(0.015)
Exempt_{HH}	0.002	(0.008)	-0.056**	(0.026)	-0.001	(0.012)	-0.096***	(0.024)	0.007	(0.023)	0.032**	(0.014)
NotExempt_{HH}	0.008	(0.008)	-0.021	(0.026)	0.014	(0.013)	-0.042*	(0.024)	0.048**	(0.023)	0.018	(0.013)
Exempt_{Both}	0.002	(0.008)	-0.028	(0.026)	0.005	(0.012)	-0.089***	(0.024)	0.012	(0.023)	0.043***	(0.014)
Constant	0.751***	(0.006)	0.394***	(0.019)	0.065***	(0.009)	0.643***	(0.017)	0.683***	(0.016)	0.071***	(0.009)
No. of observations	6,197		5,464		6,384		6,438		6,502		6,513	

Note: Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1 %, 5 %, and 10% level, respectively.

Table A6: Effect of various exemptions on the SP (average marginal effects of probit model)

	(I)		(II)	
	AME	Std. Err.	AME	Std. Err.
Exempt_{IND}	-0.232***	(0.025)	-0.241***	(0.026)
NotExempt_{IND}	0.141***	(0.025)	0.142***	(0.026)
Exempt_{HH}	0.004	(0.026)	0.012	(0.026)
NotExempt_{HH}	-0.016	(0.026)	-0.021	(0.026)
Exempt_{Both}	-0.135***	(0.025)	-0.130***	(0.027)
2 ct/kWh	–	–	-0.071***	(0.018)
4 ct/kWh	–	–	-0.145***	(0.018)
Children	–	–	-0.018	(0.017)
Homeowner	–	–	-0.021	(0.017)
Income 1200-2700	–	–	0.002	(0.027)
Income 2700-4200	–	–	0.026	(0.029)
Income $>$ 4200	–	–	0.073**	(0.032)
College degree	–	–	0.099***	(0.018)
East Germany	–	–	-0.098***	(0.018)
Female	–	–	0.037**	(0.016)
Age	–	–	-0.001*	(0.001)
Environmental concern	–	–	0.099***	(0.007)
No. of observations	4,483		3,795	

Note: SP = Support for the policy. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1 %, 5 %, and 10% level, respectively.

Table A7: Heterogeneous treatment effects by income group

	All		Not benefitting >€1200		Benefitting <€1200	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Exempt_{IND}	-0.209***	(0.066)	-0.227***	(0.070)	0.016	(0.248)
NotExempt_{IND}	0.246***	(0.066)	0.230***	(0.071)	0.265	(0.219)
Exempt_{HH}	-0.161**	(0.066)	-0.156**	(0.070)	-0.178	(0.235)
NotExempt_{HH}	-0.083	(0.074)	-0.107	(0.078)	0.064	(0.267)
Exempt_{Both}	-0.281***	(0.067)	-0.318***	(0.071)	0.003	(0.247)
Inequality aversion	0.009	(0.040)	-0.002	(0.042)	0.107	(0.140)
Self-inflicted poverty	-0.140**	(0.068)	-0.157**	(0.069)	-0.106	(0.355)
Fair household exemptions	0.058	(0.043)	0.087*	(0.045)	-0.215	(0.142)
Fair industry exemptions fair	0.168**	(0.074)	0.160**	(0.076)	0.288*	(0.168)
Affluence	0.053	(0.044)	0.034	(0.047)	0.191	(0.139)
Exempt_{IND} × Inequality aversion	-0.052	(0.056)	-0.029	(0.058)	-0.232	(0.210)
NotExempt_{IND} × Inequality aversion	-0.057	(0.057)	-0.031	(0.060)	-0.278	(0.203)
Exempt_{HH} × Inequality aversion	-0.112**	(0.056)	-0.138**	(0.059)	0.105	(0.187)
NotExempt_{HH} × Inequality aversion	-0.046	(0.058)	-0.027	(0.061)	-0.233	(0.207)
Exempt_{Both} × Inequality aversion	-0.141**	(0.057)	-0.104*	(0.059)	-0.460**	(0.193)
Exempt_{IND} × Self-inflicted poverty	0.205**	(0.096)	0.214**	(0.099)	-0.015	(0.427)
NotExempt_{IND} × Self-inflicted poverty	-0.027	(0.101)	-0.004	(0.103)	-0.586	(0.370)
Exempt_{HH} × Self-inflicted poverty	0.037	(0.089)	0.050	(0.091)	-0.113	(0.460)
NotExempt_{HH} × Self-inflicted poverty	0.223**	(0.098)	0.249**	(0.099)	0.000	(.)
Exempt_{Both} × Self-inflicted poverty	0.107	(0.090)	0.150	(0.092)	-0.270	(0.464)
Exempt_{IND} × Fair household exemptions	-0.061	(0.058)	-0.078	(0.060)	-0.049	(0.251)
NotExempt_{IND} × Fair household exemptions	-0.075	(0.058)	-0.092	(0.060)	0.215	(0.222)
Exempt_{HH} × Fair household exemptions	0.345***	(0.058)	0.317***	(0.060)	0.450*	(0.231)
NotExempt_{HH} × Fair household exemptions	0.013	(0.060)	-0.010	(0.063)	0.149	(0.222)
Exempt_{Both} × Fair household exemptions	0.181***	(0.058)	0.146**	(0.061)	0.410*	(0.231)
Exempt_{IND} × Fair industry exemptions fair	0.228**	(0.109)	0.248**	(0.111)	0.000	(.)
NotExempt_{IND} ×Fair industry exemptions fair	-0.247**	(0.106)	-0.244**	(0.109)	-0.334	(0.462)
Exempt_{HH} × Fair industry exemptions fair	-0.171	(0.112)	-0.118	(0.116)	-0.864***	(0.288)
NotExempt_{HH} × Fair industry exemptions fair	-0.057	(0.104)	-0.088	(0.107)	0.265	(0.211)
Exempt_{Both} × Fair industry exemptions fair	0.020	(0.103)	0.032	(0.106)	0.023	(0.239)
Exempt_{IND} × Affluence	-0.032	(0.061)	-0.020	(0.065)	-0.005	(0.205)
NotExempt_{IND} × Affluence	-0.030	(0.062)	0.001	(0.066)	-0.332	(0.201)
Exempt_{HH} × Affluence	-0.008	(0.059)	0.005	(0.062)	-0.037	(0.185)
NotExempt_{HH} × Affluence	0.066	(0.065)	0.093	(0.068)	-0.051	(0.234)
Exempt_{Both} × Affluence	0.099	(0.063)	0.124*	(0.067)	-0.006	(0.208)
2 ct/kWh	-0.085***	(0.019)	-0.081***	(0.020)	-0.064	(0.075)
4 ct/kWh	-0.145***	(0.020)	-0.151***	(0.020)	-0.082	(0.071)
Benefit from household exemptions	0.005	(0.030)	–	–	–	–
Children	-0.008	(0.018)	-0.005	(0.019)	-0.019	(0.064)
Homeowner	0.000	(0.017)	0.002	(0.018)	-0.054	(0.075)
College degree	0.088***	(0.018)	0.082***	(0.019)	0.115*	(0.065)
East Germany	-0.106***	(0.019)	-0.098***	(0.020)	-0.142**	(0.062)
Female	0.039**	(0.017)	0.039**	(0.018)	0.030	(0.061)
Age	-0.002***	(0.001)	-0.002***	(0.001)	-0.004*	(0.002)
Environmental concern	0.090***	(0.008)	0.095***	(0.008)	0.041	(0.032)
Constant	0.677***	(0.059)	0.686***	(0.062)	0.754***	(0.176)
No. of observations	3,256		2,944		312	

Note: Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1 %, 5 %, and 10% level, respectively.