### Climate dividends and public support for carbon pricing: The role of information and policy design \*

# **Extended Abstract**

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#### Abstract

This paper employs a large scale survey experiment among adult population in Germany to investigate public support for carbon tax-and-transfer schemes. Each respondent of an online survey is asked to evaluate four different policy alternatives, where carbon price and the share of the revenues that is redistributed via lump-sum transfers are varied. Three distinct information treatments are employed to investigate how strongly overall policy support is affected by providing respondents with additional information on the working mechanisms of carbon tax and transfer systems in general, and the distributive consequences of the respective policy bundles. We add to previous literature by investigating support for very high  $CO_2$  prices and by showing the individual and composite treatment effects of providing different pieces of information. We find that for a relatively high carbon price of 200 Euro per ton of emissions, providing a video on the mechanism behind carbon tax-and-transfer schemes increases support for such policies by roughly seven percentage points, irrespective of the share of the revenues that is redistributed. When a large share of revenues is redistributed and in addition to the video information about the distributional consequences of such a policy is provided, the effect increases to twelve percentage points with a slim majority now supporting the implementation of such a policy. Providing information about the respondents individual financial consequences of a policy only has a significant effect, when a large share of revenues is redistributed. The study thus highlights the importance of redistributing a significant share of the revenue of carbon taxation for generating public support.

**Keywords:** Q52 Pollution Control Adoption and Costs; Distributional Effects; Employment Effects, Q58 Government Policy, H23 Externalities, Redistributive Effects, Environmental Taxes and Subsidies

JEL Codes: climate policy, distributional effects, public support, fairness perceptions

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### 1 Introduction

With the increasing urgency to address climate change, understanding public sentiment is crucial for designing effective and socially acceptable environmental policies. Despite the existence of effective tools for the green transition, a significant obstacle for policymakers lies in the lack of public support, hindering their ability to utilize these tools effectively (Goulder, 2020, Douenne and Fabre, 2020, Carattini et al., 2018).

One policy that has been widely advocated as both effective and equitable is the "tax & dividend" scheme, i.e., carbon taxes whose revenue is redistributed uniformly to each adult citizen (e.g., Nordhaus, 1992, Gerlagh and Liski, 2018, Stiglitz et al., 2017). However, the unpopularity of this policy among citizens remains a persistent challenge (e.g., Dresner et al., 2006). For example, based on 40,000 respondents from 20 countries, Dechezleprêtre et al. (2022) show that such tax & dividend schemes generate only 36–38% support in high-income countries and 48–61% in middle-income countries.

In this study, we use a large-scale survey experiment in combination with microsimulation to quantify the importance of providing information about the design of tax & dividend schemes for policy support. Tax & dividend schemes are inherently complex, requiring information about multiple dimensions, including environmental effectiveness, distributional effects, and individual financial implications. While prior studies have shown that providing information about environmental effectiveness, distributional effects, and individual financial can enhance support for climate policies (e.g., Carattini et al., 2018, Mildenberger et al., 2022, Sommer et al., 2022, Dechezleprêtre et al., 2022, Douenne and Fabre, 2022), the different dimensions have mostly been analyzed in isolation.

Our paper extends the literature by jointly analyzing how these dimensions affect policy support and by comparing the relative importance of each dimension. A joint analysis is crucial as it allows to separate general misperception about the mechanism, the overall distributional concerns of the policy and individual financial factors which might be convoluted when considering all dimensions separately. Additionally, we investigate how central policy parameters—such as the share of revenues recycled to households—affect both support and the role of information.

We find that 40 Percent of respondents support a carbon tax-and-dividend scheme with a high carbon price of 200 Euros per ton and 80 percent revenue redistribution, compared to only 29 percent support when the redistribution is 20 Percent. Providing information about how the scheme works increases support by 7 percentage points, regardless of the redistribution rate. Providing information on individual or distributional policy consequences only significantly affects policy acceptance if a large share of the revues is redistributed. Looking at composite treatment effects reveals that informing people about the individual consequences of a particular policy design has little additional effect on support if they are already aware of the general mechanism. Providing information on distributional policy consequences in addition to the mechanism does however affect policy acceptance. For a the high redistribution rate, where the lower three income quintiles are net beneficiaries, overall acceptance is increased by 12 percentage points. In the low redistribution scenario, in which the policy has a negative income effect for all income groups, the composite treatment effect is smaller than if people see only the video, but still increases policy acceptance by four percentage points. A similar pattern appears if all treatments are provided jointly: In the high redistribution scenario policy acceptance is increased by eleven percentage points, while in the low redistribution scenario, the observed differences between the fully treated group, and the control group that received no information, is no longer statistically significant.

The findings suggest that high carbon taxes can gain majority support if most revenues are redistributed and people understand both the policy's emissions-reduction goals and its redistributive effects. Under low redistribution regimes, informing people about redistributive consequences may even hurt policy support, compared to explaining only the mechanism.

### 2 Study Design

For the analysis, we run a large-scale online survey experiment with 7.300 respondents representative of the German voting population with a control group and several treatment groups. Participants were recruited via Qualtrics from their online pool using quotas with respect to age, gender, education, residential area, household size, and income. This makes our sample representative with respect to these quotas for the adult German voting population. Survey participation is incentivized through monetary compensation. Individuals with a survey duration of less than three minutes were screened out by the implementation partner and are not part of the raw sample. At the beginning of the survey respondents have to answer a basic attention check,<sup>1</sup> which is passed by 94.81% of the total sample. Those failing the attention check are excluded from all analyses. The main hypotheses of the paper were pre-registered via the open science framework.

#### 2.1 Policy Vignettes

Independent of the group assignment, each respondent is asked to assess four different policy packages which are presented in Table 1. The display order was randomized. The four policy packages arise from a full factorial 2x2 design that manipulates the carbon price per ton of  $CO_2$  equivalent (45 $\in$ , 200 $\in$ ) and the redistribution share (20%, 80%). This is necessary to determine the individual effects of the price and redistribution share on policy acceptance. The carbon price refers to a price levied on  $CO_2$  emissions resulting from the burning of

<sup>&</sup>lt;sup>1</sup>Respondents are asked to click on the replies "1" and "4".

heating fuels and car fuels.<sup>2</sup> Note that  $45 \\ \oplus$  was the current carbon price in Germany on heating and car fuels in 2024 and therefore reflected the status quo when the survey was conducted. The main interest of the effects of the information treatments lie on the high price scenario.<sup>3</sup> From 2027 onward carbon prices for these fuels will be formed on a European wide market, with uncertainty about the exact price level. As prices could rise considerably above the current level, we present a high price scenario of  $200 \\ \oplus$  per tonne of CO<sub>2</sub> (Pietzcker et al., 2021). Currently the entire revenue from carbon pricing in the heating and fuel sector goes to the general budget without any direct income transfers to citizens.<sup>4</sup> In our high redistribution scenario 80% of all revenue is uniformly redistributed. This accounts for administrative costs and the fact that some of the revenue will flow into the European Union's Social Climate Fund from 2027 onward which will not make all revenue available for redistribution.<sup>5</sup> In our low redistribution scenario of 20% we model a policy where direct investments into renewable energy generation are prioritized over direct cash transfers. This illustrates a scenario where the maximal share of the Social Climate Fund is used for direct income transfers, while all revenues received beyond the Social Climate Fund are invested in green energy projects.

Table 1: Policy Characteristics

Policy package	Carbon price	Re-distribution share		
Foncy package	$(\in/\text{ton CO}_2)$	(%)		
Policy package 1	45	20		
Policy package 2	45	80		
Policy package 3	200	20		
Policy package 4	200	80		

Note: The carbon price is only levied on fuels for heating (such as gas or heating oil) and on car fuels (such as petrol and diesel). The indicated share of the resulting revenue is redistributed as a lump per individual with children receiving half the amount of adults.

<sup>&</sup>lt;sup>2</sup>This study investigates outcomes related to the introduction of the European Union's Emissions Trading System 2 (EU ETS2) covering buildings and road transport.  $CO_2$  emissions originating from the generation of electricity or district heating are covered under the EU ETS1 and are not investigated here. The implicit  $CO_2$  price for electricity and district heating in this study is therefore  $0 \in /ton CO_2$ .

<sup>&</sup>lt;sup>3</sup>The respondents who were surveyed in January 2025 (17 percent of the sample examined here) were informed about the increase in the  $CO_2$  price to 55 euros per ton as of January 1, 2025. They were asked to complete the questionnaire as if the  $CO_2$  price were still 45 euros.

<sup>&</sup>lt;sup>4</sup>To be precise, the revenue flows into the "Climate and Transformation Fund" which earmarks revenue for spending on green investments and finances among other things the elimination of a renewable energy levy and therefore reduces households electricity costs.

<sup>&</sup>lt;sup>5</sup>The size of the EU Social Climate Fund is capped at  $\bigcirc 65$  billion from 2027-2032 and will be redistributed among member states according to a needs based approach, therefore reducing the net sum available in Germany. Of this sum only a maximum of 37.5% can be spend on direct income transfers. All income beyond the  $\bigcirc 65$  billion required to fill the Social Climate Fund is transferred directly back to the general budget of member states for flexible use. As the price of CO<sub>2</sub> in the ETS II is uncertain, it is unclear what portion the EU Social Climate Fund makes up of the total revenue from carbon pricing. The share of revenue available for direct income transfers therefore hinges on the a priori unclear price (Agora Energiewende und Agora Verkehrswende, 2023).

#### 2.2 Information Treatments

We perform three types of information treatments. First, we present a video explaining the general mechanism of a carbon tax and dividend scheme (IT 1), second, we provide information about the net burden due to the policy package compared to the status quo for the own household of the surveyed individual (IT 2), and, third, we explain the the distributional policy implications for all households in comparison to the status quo (IT 3). As these information treatments are expressed in comparison to the status quo with a  $CO_2$ price of 45 $\mathfrak{C}$ , we focus on the effects of treatments in the high price policy bundles with a  $CO_2$ price of 200 $\mathfrak{C}$ . The particular information conveyed under IT 2 and IT 3 changes depending on the redistribution share, however the structure of the information treatment remains the same.

The combinations of these information treatments create eight groups , one being the pure control group and seven treatment groups. Table 2 presents the control and treatment groups with their relevant information treatment status.

Table 2: Treatment and control groups

Group	Information given			
Group	IT 1	IT $2$	IT 3	
Treatment group 1	$\checkmark$	$\checkmark$	$\checkmark$	
Treatment group 2	$\checkmark$	$\checkmark$	X	
Treatment group 3	$\checkmark$	X	$\checkmark$	
Treatment group 4	$\checkmark$	X	X	
Treatment group 5	X	$\checkmark$	$\checkmark$	
Treatment group 6	X	$\checkmark$	X	
Treatment group 7	X	X	$\checkmark$	
Control group	X	X	×	

Note: IT 1 represents the presentation of a video explaining the mechanism of a carbon tax and dividend scheme in general. IT 2 represents the disclosure of the net burden of a policy package in comparison to the status quo for the respondents own household. IT 3 represents the disclosure of the distributional consequences of the policy package.

All respondents independent of the group assignment receive the information that the indicated share of the money collected via carbon pricing is paid out as a lump sum payment to all citizens in Germany under the label of a climate dividend, where children receive half the amount of adults. Additionally, all respondents receive the information how much money this would be per adult and child. All respondents are informed that the remaining money is invested in renewable energy infrastructure in Germany. Finally, all individuals are informed about the relative rank of each policy design in terms of their likely climate impact; i.e. we informed all respondents which of the four policies would probably achieve the largest, second largest, second lowest  $CO_2$  reduction respectively.<sup>6</sup>

 $<sup>^{6}</sup>$ This ranking was conducted under the assumption that higher CO<sub>2</sub> prices reduce emissions, while redistributing higher shares of the revenue back to the citizens increases emissions in comparison to redistributing lower shares.

#### 2.3 Measured variables and main outcomes

In the survey we first ask about basic demographics and collect information about the consumption of fossil fuels for heating and transport. We use this information to calculate the likely effect of a carbon-price increase on the respondent's own household. This calculation is based on results from a micro-simulation of  $CO_2$  emissions using the German Socio Economic Panel (Bach et al., 2024).

We measure two main outcomes after the information treatment. In each policy vignette respondents are asked to evaluate their justice perception of the net burden of the respective policy package for their own household, for the richest 20% of German households and for the poorest 20% of German households. We use a 3 point scale, distinguishing whether the respondent perceive the net burden of the policy on the respective group as unfairly too low, fair, or unfairly too high. Our second main outcome is the stated support for the introduction of the specific tax-and-dividend scheme, measured on a 6-point Likert scale. For the analyses presented here, we summarize positive and negative responses into a binary variable that equals one when respondents were "very in favor", "in favor" or "slightly in favor" of the policy and 0 if they indicated to be "very against", "against" or "slightly against" the policy. For those who reject the policy overall, we ask for potential reasons why the policy is rejected. The following sections will present the results of the information treatments on overall policy acceptance. Our analyses of the treatment effects on justice perceptions and the mediation of outcomes through the justice channel is current work in progress but shows that the information treatments significantly alter respondents justice perception of the respective policy bundle.

### 3 Findings

#### **3.1** Policy Characteristics

To quantity the importance of the price effect and the redistribution effect we estimate the following model using responses only from the control group:

$$Y_{ij} = \delta_1 \operatorname{price}_j + \delta_2 \operatorname{share}_j + \delta_3 \operatorname{price}_j \times \operatorname{share}_j + \lambda_i + \epsilon_{ij} \tag{1}$$

where  $Y_{ij}$  is the binary policy acceptance of individual *i* with respect to policy *j*, price<sub>j</sub> is the CO<sub>2</sub> price in policy *j*, share<sub>j</sub> is the share of revenues that is redistributed via lump sum as a climate dividend in policy *j*,  $\lambda_i$  are individual fixed effects and  $\epsilon_{ij}$  is the error term of the model.

We find a sizable negative effect of the high price and the low redistribution rate on overall policy acceptance. The effect size of the high  $CO_2$  price is somewhat larger with ten percentage points than the effect of the low redistribution rate of eight percentage points. The interaction between high price and low redistribution share is also significant and indicates that it is the combination of these two features which most strongly reduce policy acceptance.

	(1)	(2)
	OLS FE	OLS FE
Price 200	-0.102***	-0.070***
	(0.014)	(0.019)
Share 20	-0.082***	-0.051***
	(0.014)	(0.018)
Interaction		-0.063**
		(0.025)
Observations	3,226	3,226
Respondents	838	838

Table 3: Effect of Policy Characteristics on Acceptance

Notes: Table 3 reports the effect of the higher price of 200 instead of 45 and the lower redistribution share of 20% instead of 80% on acceptance while controlling for the price or share respectively. Acceptance here is measured as a binary variable, pooling all responses with the outcome very in favor, in favor, rather in favor of the implementation of the proposed policy package. All specifications include respondent fixed effects. Standard errors are clustered on the respondent level.

Significance Levels: \* p-value < 0.10; \*\* p-value < 0.05; \*\*\* p-value < 0.01

#### 3.2 Information Treatments

Next, we study the effect of providing information on the general mechanism (IT 1), personal consequences (IT 2), and distributional consequences (IT 3) of the carbon tax-and-transfer systems on policy acceptance. We restrict these analyses to the high price scenarios as the information treatments were framed in comparison to the status quo of the low price.

To quantify the importance of the respective information on the acceptance of the implementation of the respective policy bundle, we estimate the following model, separately for each information treatment. We use data from the control group and the respective treatment group under investigation for the estimation. For each information treatment we estimate the model twice, one using responses to the low redistribution rate and once responses for the high redistribution rate. We use only the treatment groups that received the respective information and the control group.

$$Y_{ij} = \beta_k \operatorname{IT}_k + \gamma \operatorname{X}_i + \epsilon_{ij} \tag{2}$$

where  $Y_{ij}$  is the binary policy acceptance of individual *i* with respect to policy *j*,  $IT_k$  is one of the three information treatments,  $X_i$  are respondent characteristics and  $\epsilon_{ij}$  is the error term of the model.

#### Information about general mechanism of tax & dividend schemes

Half of the entire sample of respondents are presented a short video explaining the general mechanism behind a carbon tax- and transfer system. The video on the one hand explicates that carbon-emissions are currently priced in Germany and that the  $CO_2$  has to increase to meet Germany's emissions reduction goals. It also explains that the revenue from carbon pricing could be redistributed to all citizens in form of a climate dividend and why this combination of pricing and redistribution would still have a positive climate effect.

As previous studies find a significant lack of understanding and knowledge about such systems (e.g., Kallbekken et al., 2011, Baranzini and Carattini, 2017, Douenne and Fabre, 2022), we expect a positive effect of this treatment on policy acceptance overall.

We report in table 4 that, irrespective of the redistribution rate, acceptance of tax-anddividend schemes was 6.5 percentage points higher in the group of respondents who were provided with information on the mechanism of carbon tax-and-transfer schemes, than in the group of those who did not receive such information (Columns 1 and 2). Restricting the treatment group to individuals who answered two questions of understanding on the video correctly, increases the treatment effect slightly to almost 8 percentage points (Columns 3 and 4).

	(1) ATE 20%	(2) ATE 80%	(3) ATET 20%	(4) ATET 80%
Treatment effect	$\begin{array}{c} 0.066^{***} \\ (0.023) \end{array}$	$\begin{array}{c} 0.065^{***} \\ (0.025) \end{array}$	$\begin{array}{c} 0.078^{***} \\ (0.028) \end{array}$	$\begin{array}{c} 0.077^{***} \\ (0.029) \end{array}$
Observations Control group mean	$1,590 \\ 0.29$	$\begin{array}{c} 1,581\\ 0.40\end{array}$	$1,268 \\ 0.29$	$1,259 \\ 0.40$
Individual Controls	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$

Table 4: Effect of Video Treatment on Acceptance (binary outcome)

Notes: The table shows the marginal effect of receiving an information video on the general mechanism of tax-and-dividend policies vs. not receiving this information. Results are only based on respondents who did not receive any other information treatment. Coefficient estimates are based on logit models with overall policy acceptance as the outcome variable (1 = slightly in favor to strongly in favor). All models control for respondents age group, sex, education and urban vs. rural living environment. Models (3) and (4) restricts the sample to individuals who passed two questions that tested whether the video content was actually understood and thus reports the average treatment effect on the treated. Standard errors are clustered on the respondent level.

Significance levels: \* p-value < 0.10; \*\* p-value < 0.05; \*\*\* p-value < 0.01

#### Information about individual financial situation

Information treatment IT 2 provides respondents with an estimate of the net yearly financial effect of the policy package for their own household. This is calculated and framed in comparison to the status quo of no climate dividend and a  $CO_2$  price of 45 $\oplus$ . Table 5 presents the marginal effect of receiving this information on overall policy acceptance. As before we

report findings separately for the low and the high redistribution share. Columns (1) and (4) present pooled effects, columns (2-3) and (5-6) present effects separately for individuals who received the information that they would financially win or lose from the implementation of the policy in comparison to the status quo. We find a small positive but insignificant effect on the policy acceptance for winners under the low redistribution rate. Interestingly, the effect is close to zero for losers under the low redistribution rate, indicating that respondents already expect to be strongly negatively affected by such a policy with the information treatment providing little additional information. Under the high redistribution rate the effect is sizable and positive for individuals that are winners under this policy bundle. The effect size is similar but negative for losers under this policy, but remains insignificant due to the low sample size. This can be seen as an indication that in contrast to a low redistribution share respondents have a less robust prior with respect to their personal financial consequences when a significant amount of revenues from carbon pricing is redistributed.

	(1)	(2)	(3)	(4)	(5)	(6)
		20%			80%	
	Pooled	Winner	Loser	Pooled	Winner	Loser
Treatment effect	0.009 (0.023)	0.041 (0.060)	-0.002 (0.025)	$0.048^{*}$ (0.025)	$\begin{array}{c} 0.072^{***} \\ (0.028) \end{array}$	-0.074 (0.059)
Observations	1,584	243	$1,\!315$	1,580	1,283	269
Control group mean	0.29	0.29	0.29	0.40	0.40	0.40
Individual Controls	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$

Table 5: Effect of own burden information treatment on acceptance

Notes: The Table shows the marginal effect of having received information on personal policy consequences vs. not having received this information in the high price scenario. Results are only based on respondents who did not receive any other information treatment and are presented separately for the low (columns (1)-(3)) and high redistribution setting (columns (4)-(6)). Coefficient estimates are based on logit models predicting overall policy acceptance (1 = slightly in favor to strongly in favor). Results are reported for the full sample (Column 1 and 4) and separately for respondents who were presented with the information that they would financially benefit (columns 2 and 5) or lose (columns 3 and 6) due to the implementation of the policy bundle. All models control for the respondents age group, sex, education and urban vs. rural living environment. Standard errors are clustered at the individual level.

Significance levels: \* p-value < 0.10; \*\* p-value < 0.05; \*\*\* p-value < 0.01

#### Information about distributional effects

As in the previous sections we report effects of the distributional treatment separately for the low and the high redistribution rate. While in both cases the figure expresses the progressive aspect of the policy in terms of absolute financial burden over the five income quintiles, this becomes more salient in the high redistribution policy. Here the lowest two quintiles benefit financially from the policy in comparison to the status quo, while the richest two quintiles lose financially. When only 20% of revenues are redistributed, all quintiles lose financially. As before we find no significant treatment effect of the distributional information when only

a small amount of revenue from carbon pricing is redistributed. In contrast the distributional information increases policy acceptance by 6.5 percentage points in the high redistribution policy.

	(1) 20%	(2) 80%
Treatment effect	0.006	0.065***
	(0.023)	(0.025)
Observations	$1,\!595$	$1,\!585$
Control group mean	0.29	0.40
Individual Controls	$\checkmark$	$\checkmark$

Table 6: Effect of distributional treatment on acceptance

Notes: The Table shows the marginal effect of having received information on the distributional consequences of the policy bundle in comparison to the status quo vs. not having received this information. Results are reported for the high price scenario and separately for the low and high redistribution rate. Coefficient estimates are based on logit models predicting overall policy acceptance (1 = slightly in favor to strongly in favor). All models control for the respondents age group, sex, education and urban vs. rural living environment. Standard errors are clustered at the individual level.

Significance levels: \* p-value <0.10; \*\* p-value <0.05; \*\*\* p-value <0.01

#### 3.3 Composite treatment effect

So far we have quantified the effect of providing information about the general mechanism of tax & dividend schemes, about the implications for the individual financial situation and about the distributional effects for the population and have documented that information treatments can significantly alter the respondent's policy acceptance. However, none of the individual information treatments would succeed in achieving a public majority for a policy bundle with a high carbon price of 200 Euro per ton of emissions - a price which is not unrealistic for the future.

We therefore analyze if the combination of the different information treatments can increase public support and lead to a majority of acceptance in the population. For this we estimate the composite effect of the different information treatments.

To test the composite effect we augment our model 2 in the following way:

$$Y_{ij} = \beta_A \operatorname{IT}_A + \gamma \operatorname{X}_i + \epsilon_{ij} \tag{3}$$

where  $Y_{ij}$  still represents the binary policy acceptance of individual i with respect to policy j, IT<sub>A</sub> refers to receiving the information treatment on the general mechanism of a carbon tax and dividend scheme and in addition either the information treatment on individual financial consequences or the distributional treatment, or both, X<sub>i</sub> are respondent characteristics and  $\epsilon_{ij}$  is the error term of the model. As in 3.2 we use responses from the control group and the respective treatment group. Table 7 reports the composite effect of providing several information treatments jointly. In Panel A we focus on the high redistribution scenario with 80% redistribution in Panel B on the low redistribution scenario (20%). In the first column we repeat the effect of the information of the general mechanism, in the second column we present the composite effect of providing information about the own financial financial situation together with information about the general mechanism, column 3 shows the composite effect of the information about the distributional effect together with the general mechanism and the final column shows the composite effects of all treatments.

The additional information about the own financial situation does not change the acceptance for the policy when pooling all respondents (i.e. both winners and losers). This holds both for the high and the low redistribution rate. However, providing the distributional information in the high redistribution scenario together with the video shifts acceptance positively by around twelve percentage points. The composite effect of all treatments (Column 4) has a similar but slightly smaller size. Thus, the combination of information about the mechanism and the distributional effect increases the acceptance from about 40% in the baseline without any information treatment of the policy to around 53% of respondents and therefore secures a small majority.

We find a different pattern in the low redistribution scenario (Panel B). The distributional information (Column 3) decreases the acceptance in comparison to a group that only receives information about the mechanism. While this effect is not statistically significant, the negative effect increases in size (-4.4 percentage points) when the individual information is also provided (column 4) and becomes statistically significant at the 10% level.

The different patterns in the high and low distributional scenario show that additional information beyond the general mechanism is important. While in the high redistribution scenario households in the bottom three quintiles would experience an increase in income, in the low redistribution scenario all households loose. Without the detailed information about this distributional effects the increase in the support due to the video treatment is very similar in both scenarios, however with the distributional information there is only a majority for a tax & dividend policy with a high redistributive share.

a) 80% redistribution share						
a) 001	(1)	(2)	(3)	(4)		
	ATE	ATE	ATE	ATE		
Video only	0.065***					
Video only	(0.005)					
Video & individual	(0.020)	0.068***				
		(0.025)				
Video & dist.			0.121***			
			(0.025)			
Video & individual & dist.				$0.112^{***}$		
				(0.025)		
Observations	1581	1,542	1,582	1,575		
Control group mean	0.40	0.40	0.40	0.40		
Individual Controls	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
b) 209	% redistribu	ution share				
	(1)	(2)	(3)	(4)		
	ATE	ATE	ATE	ATE		
Video only	0.066***					
c .	(0.023)					
Video & individual		$0.069^{***}$				
		(0.023)				
Video & dist.			$0.041^{*}$			
			(0.023)			
Video & individual & dist.				0.022		
				(0.023)		
Observations	1590	$1,\!554$	$1,\!592$	$1,\!586$		
Control group mean	0.29	0.29	0.29	0.29		
Individual Controls	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		

Table 7: Additional effect of treatments when video was already presented

Notes: The table shows the additional effect of the information treatments conditional on respondents already having received the video treatment that explained the general mechanism behind a carbon tax and dividend scheme. Column (1) repeats the pure effect of the video treatment from table 4 where individual that received only the video treatment are compared with the control group. Column (2) reports the additional treatment effect of the information treatment with individual financial consequences, conditional on having received the video treatment. For this individuals that received only the video are compared with individuals that received the video and the individual consequences treatment. Likewise, column (3) reports the additional effect of the distributional treatment and column (4) reports the additional effect of receiving both the distributional and the individual treatment.

Significance levels: \* p-value < 0.10; \*\* p-value < 0.05; \*\*\* p-value < 0.01

## 4 Conclusion

The study highlights the importance of redistribution in the design of carbon tax-anddividend policies. It suggests that when a substantial share of revenues is redistributed, even policies with high carbon prices can garner broad public support, particularly if people are informed about both the mechanism of the policy and its distributional effects. However, when redistribution is low, such policies face much lower public acceptance, even with detailed information.

## References

- Agora Energiewende und Agora Verkehrswende (2023). "Der CO2-Preis für Gebäude und Verkehr. Ein Konzept für den Übergang vom nationalen zum EU-Emissionshandel".
- Bach, Stefan, Mark Hamburg, Simon Meemken, Marlene Merker, and Joris Pieper (2024). "Carbon pricing: Swift introduction of a climate dividend needed, reduce at higher incomes". DIW Weekly Report 14(43/44), pp. 251–259.
- Baranzini, Andrea and Stefano Carattini (2017). "Effectiveness, earmarking and labeling: testing the acceptability of carbon taxes with survey data". en. *Environmental Economics* and Policy Studies 19(1), pp. 197–227. DOI: 10.1007/s10018-016-0144-7. (Visited on 07/07/2023).
- Carattini, Stefano, Maria Carvalho, and Sam Fankhauser (2018). "Overcoming public resistance to carbon taxes". en. WIREs Climate Change 9(5), e531. DOI: 10.1002/wcc.531. (Visited on 10/15/2024).
- Dechezleprêtre, Antoine, Adrien Fabre, Tobias Kruse, Bluebery Planterose, Ana Sanchez Chico, and Stefanie Stantcheva (2022). Fighting Climate Change: International Attitudes Toward Climate Policies. en. Tech. rep. w30265. Cambridge, MA: National Bureau of Economic Research, w30265. DOI: 10.3386/w30265. (Visited on 07/07/2023).
- Douenne, Thomas and Adrien Fabre (2020). "French attitudes on climate change, carbon taxation and other climate policies". en. *Ecological Economics* 169, p. 106496. DOI: 10. 1016/j.ecolecon.2019.106496. (Visited on 07/07/2023).
- (2022). Yellow vests, pessimistic beliefs, and carbon tax aversion. DOI: 10.1257/POL.
  20200092.
- Dresner, Simon, Louise Dunne, Peter J. Clinch, and Christiane Beuermann (2006). "Social and political responses to ecological tax reform in Europe: an introduction to the special issue". *Energy Policy*. DOI: 10.1016/J.ENPOL.2004.08.043.
- Gerlagh, Reyer and Matti Liski (2018). "Carbon Prices for the Next Hundred Years". en. *The Economic Journal* 128(609), pp. 728–757. DOI: 10.1111/ecoj.12436. (Visited on 07/07/2023).
- Goulder, Lawrence H. (2020). "Timing Is Everything: How Economists Can Better Address the Urgency of Stronger Climate Policy". *Review of Environmental Economics and Policy* 14(1), pp. 143–156. DOI: 10.1093/reep/rez014. (Visited on 07/07/2023).
- Kallbekken, Steffen, Stephan Kroll, and Todd L. Cherry (2011). "Do you not like Pigou, or do you not understand him? Tax aversion and revenue recycling in the lab". Journal of Environmental Economics and Management 62(1), pp. 53-64. DOI: 10.1016/j.jeem. 2010.10.006. (Visited on 10/07/2024).

- Mildenberger, Matto, Erick Lachapelle, Kathryn Harrison, and Isabelle Stadelmann-Steffen (2022). "Limited impacts of carbon tax rebate programmes on public support for carbon pricing". DOI: 10.1038/S41558-021-01268-3.
- Nordhaus, William D. (1992). "An Optimal Transition Path for Controlling Greenhouse Gases". *Science* 258(5086), pp. 1315–1319. (Visited on 07/07/2023).
- Pietzcker, Robert, Janik Feuerhahn, Luke Haywood, Brigitte Knopf, Falko Leukhardt, Gunnar Luderer, Sebastian Osorio, Michael Pahle, Renato Dias Bleasby Rodrigues, and Ottmar Edenhofer (2021). Notwendige CO2-Preise zum Erreichen des europäischen Klimaziels 2030. de. Tech. rep. Potsdam Institute for Climate Impact Research, 20 pages. DOI: 10.48485/PIK.2021.007. (Visited on 08/15/2023).
- Sommer, Stephan, Linus Mattauch, and Michael Pahle (2022). "Supporting carbon taxes: The role of fairness". *Ecological Economics* 195, p. 107359. DOI: 10.1016/j.ecolecon. 2022.107359. (Visited on 10/15/2024).
- Stiglitz, Joseph E, Nicholas Stern, Maosheng Duan, Ottmar Edenhofer, Gaël Giraud, Geoffrey M Heal, Emilio Lèbre La Rovere, Adele Morris, Elisabeth Moyer, Mari Pangestu, et al. (2017). "Report of the high-level commission on carbon prices".