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Harnessing social information to improve public support for Pigouvian taxes

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Harnessing social information to improve public support for Pigouvian taxes [a]

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Abstract

Pigouvian taxes are often unpopular among the general public. We test the effectiveness of social information provision to improve support for such taxes. In a lab experiment that involves a market game with externalities, we provide subjects with information about other participants' personal opinions about the "right thing to do" (voting, or not, for tax implementation). To gain insight into the causal mechanism by which social information impacts subjects' votes, we also elicit personal, normative, and positive beliefs. Our findings demonstrate a causal effect of social information provision on subjects' support for the tax, and that subjects' changes in beliefs is a causal mechanism through which this increased support for the tax is made possible. We also show that subjects who experience the tax are more likely to support it, and that the tax significantly reduces externalities in the game. We therefore highlight the pivotal role of beliefs in voting behaviors and the acceptability of Pigouvian taxes.

Keywords : Beliefs; Externality game; Pigouvian taxes; Social information; Voting behavior.

JEL Codes : C92; D91; H23.

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1 Introduction

Corrective taxes, designed to promote healthier, safer, and more environmentally friendly behaviors, have been implemented within several contexts. Examples include taxes on alcohol (Griffith et al., 2019), cigarettes (Christiansen and Smith, 2012), unhealthy food (Yaniv et al., 2009), road safety (Langer et al., 2017), fuel (Sterner, 2007), and pollution (Ambec and Coria, 2021; Ambec and De Donder, 2022). Despite their potential benefits, such taxes often face limited public support (Hagmann et al., 2019; Maestre-Andrés et al., 2019; Douenne and Fabre, 2020; Douenne and Fabre, 2022), with acceptance varying depending on the specific behavior being targeted (Reynolds et al., 2019).

The carbon tax has, for example, come under scrutiny due to notable resistance from the public, with the 'Yellow vests' movement in France (2018) serving as a striking illustration (e.g., Klenert et al., 2018; Douenne and Fabre, 2022; Ploeg et al., 2022). Although alternative measures, such as subsidies and green investments, may enjoy greater public favor (Heres et al., 2017; Dechezleprêtre et al., 2022), there is mounting consensus among economists to favor carbon pricing as a pivotal tool in curtailing greenhouse gas emissions.[1] Given the escalating advocacy for and global adoption of carbon taxes (The World Bank, 2022), fostering public endorsement for such an instrument, rather than pivoting to alternative policy instruments, appears to be a pragmatic approach (Gravert and Shreedhar, 2022; Kallbekken, 2023).

Our main objective is to examine the feasibility of fostering the acceptability of corrective externality taxes and, specifically, the Pigouvian tax in our context. To this end, several strategies have been explored in previous research: renaming the tax (Kallbekken et al., 2011), disseminating budgetary information (Heres et al., 2017), promoting peer-based explanations detailing the benefits of the tax (Huang and Xiao, 2021), and combining the tax with a subsidy (Andreassen et al., 2024). This paper directs its focus towards the influence of social information on voting patterns that favor the tax. Given the substantial behavioral impact of social information demonstrated in various domains (Cason and Mui, 1998; Frey and Meier, 2004; Alpizar et al., 2008; Bicchieri and Xiao, 2009; Shang and Croson, 2009; Gächter et al., 2013; Chen et al., 2017; Goeschl et al., 2018; Bonan et al., 2020), it appears promising to implement social information in the context of increasing support for such taxes, especially considering the collective nature of addressing negative externalities. Moreover, the use of social information is also justified from a theoretical perspective, given the fact that economic agents generally seek to conform to their peers (see e.g., Bernheim, 1994; Akerlof, 1997), which could lead to, in our case, an alignment of subjects' beliefs with others' beliefs reported with the social information.

Our second objective delves deeper, seeking to provide some explanation on the mecha-

[1] For instance, see the Economists' Statement on Carbon Pricing by the European Association of Environmental and Resource Economists and the Economists' Statement on Carbon Dividends endorsing a carbon dividends framework for U.S. climate policy.

nism behind the effect of social information on tax endorsement, with a focus on the influence of personal beliefs and beliefs about others. Indeed, recent studies have highlighted the crucial role of beliefs in the behavior of economic agents in several contexts: health decisions (Angerer et al., 2024), participation in the job market (Bursztyn et al., 2020), pro-environmental behaviors (Jachimowicz et al., 2018; Reynaud and Ouvrard, 2024), information acquisition (d'Adda et al., 2024), etc. We contribute to this expanding literature by highlighting the potential role of beliefs in terms of voting behaviors. In our case, we want to assess whether subjects' beliefs can be influenced in order to, ultimately, foster the acceptability of corrective taxes.

To achieve our objectives, we conduct a lab experiment using a market game with negative externalities. Central to our analysis is the understanding of the influence of social information on participants' voting behaviors. Specifically, we focus on: (i) subjects' votes for/against a Pigouvian tax aimed at addressing these negative externalities; and (ii) three distinct types of beliefs that we postulate play a role in shaping the impact of social information on tax support. This social information comprises the personal views of participants involved in a different experimental session that examines the appropriateness of voting for the tax: indeed, these personal views tend to largely favor the tax. Examining these beliefs further, and by drawing inspiration from d'Adda et al. (2020), we categorize them into personal views on the 'appropriate' vote ('Tax policy' or 'No policy'), normative expectations (participants' beliefs about their peers' beliefs on the "right thing to do"), and on positive expectations (participants' beliefs about their peers' actual votes).

Overall, we propose a 2×2 design based on the disclosure of social information (or not) and the elicitation of beliefs (or not). The main originality of our design is thus to allow us to: (i) study the *causal effect* of social information on votes for the Pigouvian tax; and (ii) investigate whether subjects' changes in beliefs is a *causal mechanism* through which social information provides increased support for the Pigouvian tax.

Our paper advances three strands of the literature. First, we contribute to the literature exploring the impact of social information on behavior, specifically peers' prosocial actions (e.g. Cason and Mui, 1998; Frey and Meier, 2004; Alpizar et al., 2008; Bicchieri and Xiao, 2009; Shang and Croson, 2009; Gächter et al., 2013; Chen et al., 2017; Goeschl et al., 2018; Bonan et al., 2020). We align closely with Goeschl et al. (2018) by examining the mechanisms through which social information influences participants' behavior, focusing particularly on the modification of beliefs. However, unlike Goeschl et al. (2018), who focus their investigation on descriptive social information, we examine normative social information. Indeed, in relation to referenda, citizens generally vote on *specific* topics (as in Switzerland in 2021 regarding the carbon tax), which makes it more challenging to rely on prior descriptive information if the topic under consideration differs from the referendum topic. Therefore, in our context it is more appropriate to provide information on what others think *should be done* to influence

subjects' own willingness to vote for tax implementation.[2]

Second, our work intersects with the expanding literature on the elicitation of social norms, as evidenced by studies such as Krupka and Weber (2013), Kimbrough and Vostroknutov (2016), Chang et al. (2019), and d'Adda et al. (2020). Our study is most closely aligned with d'Adda et al. (2020), who investigate the impact of social information on subjects' beliefs in a dictator game. They assess: (i) participants' personal values on what they deem to be the dictator's most appropriate behavior; (ii) their normative beliefs, or their perceptions of other participants' personal values, on the dictator's behavior; and (iii) their positive beliefs about the likely actions of dictators in their session. We have adapted this method of eliciting beliefs of d'Adda et al. (2020) to our study context, focusing on the topic of public support for taxation. Our goal is to discern whether personal beliefs serve as a mechanism for the influence of social information on voting behaviors. A key distinction between our approach and theirs is in the sourcing of social information data. While d'Adda et al. (2020) construct a representation of subjects' opinions on the right thing to do through selection, we opt for a direct approach, drawing from the unaltered personal values of subjects in a given session.

Lastly, our research adds to the literature that assesses the acceptability of Pigouvian taxes (e.g. Kallbekken et al., 2011; Cherry et al., 2014; Tiezzi and Xiao, 2016; Heres et al., 2017; Cherry et al., 2017; Janusch et al., 2020; Andreassen et al., 2024). These experiments have been instrumental in understanding the nuances of acceptability regarding Pigouvian taxes, especially in the context of environmental considerations. Key findings include the notion that subjects' opposition to such taxes does not stem from misunderstanding the objective of the taxes, but rather from a *general aversion* to taxes (Kallbekken et al., 2011), an attitude not mirrored by their receipt of any subsidies (Heres et al., 2017). Furthermore, those who have directly experienced the effects of the Pigouvian tax (Cherry et al., 2014), or who possess egalitarian values (Cherry et al., 2017), are more inclined to vote in its favor. Moreover, after subjects have encountered a particular policy, its impact on their payoffs significantly influences their voting behavior (Janusch et al., 2020). These experiments generally use a 'partner' design, where subjects are placed into fixed groups. This setup makes it challenging to distinguish individual subjects' innate preferences for a Pigouvian tax from the influence exerted by the behavior of other group members. This nuance is critical for our study, as we aim to specifically assess the influence of social information on subjects' tax preferences. To achieve a clear separation of these effects, our experiment employs a 'stranger' design, wherein subjects interact with a changing set of participants, reducing the potential for group dynamics to confound the results.

Anticipating our results, we first demonstrate a causal effect of social information provision on subjects' voting behavior: when provided with social information, they significantly support

[2]In reality, governments may gather this type of information through survey opinions.

Pigouvian taxes more often. However, this effect on subjects' support for the tax is mitigated when beliefs are elicited. Additional analyses suggest that this mitigated effect does not come from a priming effect resulting from beliefs elicitation, suggesting possible information overload or survey fatigue. Relying on a mediation analysis, we are further able to show that a change in subjects' beliefs is a causal mechanism through which this increased support is made possible. Next, our data suggest that subjects who experience the tax first-hand exhibit a higher likelihood of supporting it. Finally, and as expected, the tax proves effective in curtailing the negative externalities within the game, evidenced by a decrease in purchased quantities.

These findings therefore highlight the pivotal role of beliefs in individuals' voting behaviors and bear implications not only for environmental taxes but also for the broader spectrum of externality-corrective taxes. Despite the endorsement of many economists, there is tangible public resistance, as witnessed in mass demonstrations in France in 2013 and 2018, and Washington State, USA, between 2016 and 2018 (Carattini et al., 2017; Anderson et al., 2023). Identifying strategies to enhance the acceptability of these taxes is thus paramount in the quest to mitigate externalities.

The remainder of the paper is organized as follows. Section 2 describes our experimental design, including the market, the votes, and the treatments in our experiment, followed by our predictions and the experimental procedures. Section 3 presents our experimental results, and Section 4 discusses and concludes our results.

2 Experimental design

Our experiment is based on a market game with externalities (see e.g. Kallbekken et al., 2011; Cherry et al., 2017; Heres et al., 2017). In this section, we first discuss the theoretical basis of the externality game. We then describe the design of our experiment, which consists of three stages separated by votes for the implementation of a tax. Finally, we outline our two treatments (the provision of social information and beliefs elicitation).

2.1 Market game

Consider a market with N buyers. Each buyer n chooses to purchase a quantity $q_n \in \{0, 1, \ldots, Q\}$ of a fictitious good at the market price p (horizontal supply curve). All buyers have the same resale values (or willingness-to-pay) that depend on the quantity of the good V_q. The resale values define the buyers' demand curve. However, each unit purchased generates an external cost e on all other buyers. Buyer n's payoff is therefore:

$$\pi_n = \sum_{q=1}^{q_n} (V_q - p) - Q^T_{-n} \times e \tag{1}$$

with Q^T_{-n} the total quantity of goods purchased by all buyers but n. In other words, $Q^T_{-n} \times e$ is the total external cost imposed on buyer n due to the purchases of the other buyers.

Externalities can be internalized by a tax t. To simplify our setting, let us consider that the tax revenues are equally redistributed to all buyers. Then, buyer n's payoff when the tax is implemented is:

$$\pi^t_n = \sum_{q=1}^{q_n} (V_q - p) - Q^T_{-n} \times e - t \times q^n + \frac{Q^T \times t}{N} \tag{2}$$

where Q^T is the total quantity of goods purchased by all buyers in the market.

In our experiment, we consider groups of $N = 5$ buyers who can purchase up to $Q = 8$ units of the good whose resale value is the same for all buyers and during all periods; that is, $V_1 = 85$, $V_2 = 70$, $V_3 = 60$, $V_4 = 55$, $V_5 = 45$, $V_6 = 40$, $V_7 = 30$, $V_8 = 15$, respectively. The market price is kept constant at $p = 38$ throughout all periods. Each unit purchased on the experimental market imposes an external cost of $e = 3$ to the other buyers.[3] The Pigouvian tax that fully internalizes the external cost is therefore $t = (N-1) \times e = 4 \times 3 = 12$.[4]

In the unregulated market (i.e., under *No policy*), the Nash equilibrium is such that each subject purchases six units and the associated group payoff is therefore 275. In the regulated market (i.e., under the *Tax policy*), the Nash equilibrium is now such that each subject purchases four units and the associated group payoff is 350. Implementing the Tax policy is therefore theoretically welfare-enhancing. These two equilibria are represented in Fig. 1.

2.2 Votes

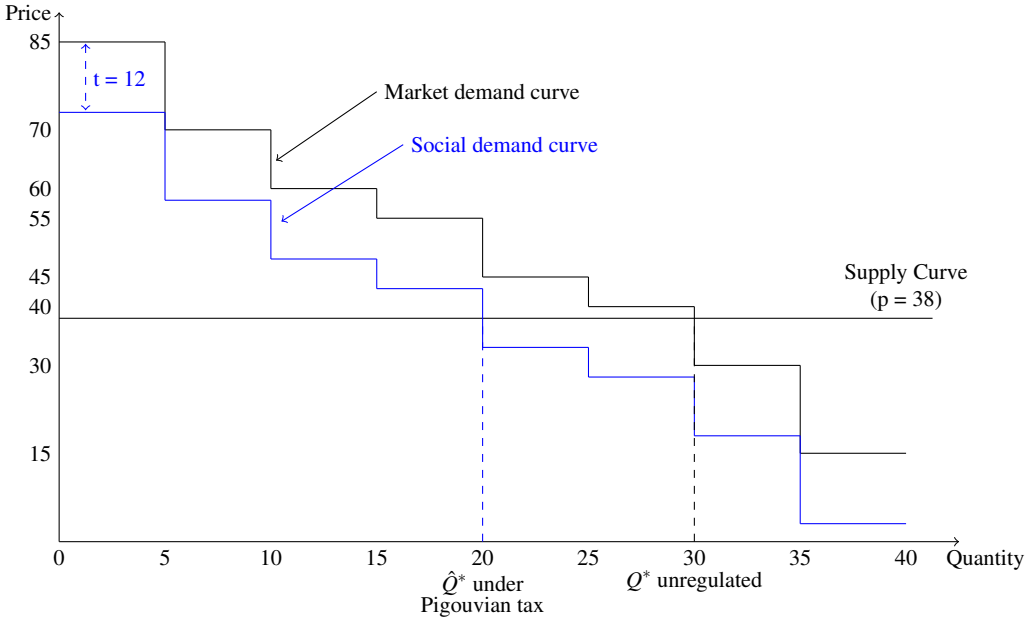
The experiment consists of three stages, each composed of seven periods. In the first stage, buyers trade without taxation. At the beginning of the second stage (that is, before subjects decide on their purchases), they first vote either for the *Tax policy* or for the *No policy*. Then, depending on the result of the vote (majority rule), they play the game with or without the tax. The third stage is identical to the second.

The votes in Stage 2 and Stage 3 are two different measures of public support for the corrective tax and are our main variables of interest. While the first vote allows us to test our treatment effect, the second vote aims to capture the effect of actual experience with the tax. Indeed, some subjects might have experienced the tax during the second stage and may consider it as an efficient instrument to reduce the imposed externality, inducing them to vote for the tax again. Conversely, some subjects may be unsatisfied with the tax policy and no longer vote for

[3] These parameters are identical to those in the design of Cherry et al. (2012) and Cherry et al. (2017).

[4] Note that if we take into account the fact that the tax is recycled, the net external cost is $(1 - \frac{1}{N})e$, i.e., $\frac{4}{5} \times 3 = 2.4$. Then, the Pigouvian tax is $4 \times 2.4 = 9.6$. Therefore, the final price is $38 + 9.6 = 47.6$ and the Nash equilibrium under tax implementation is still to purchase four units. This would correspond to a situation where subjects take into account the impact of their decision on the redistributed amount of tax.

Figure 1: Supply and demand in the market game



its implementation. Finally, some subjects may vote for it simply to try it. Between stages, subjects are re-matched into different groups to avoid group history and reputational effects.

2.3 Payoff information

To simplify the understanding of payoffs, we provide subjects with payoff tables in the case of the *No policy* option (related to equation 1) and in the case of the *Tax policy* option (related to equation 2). These tables, as well as the instructions, are presented in Appendix A.

The subjects each have complete information on the recycling of tax revenues. At the end of each period, they: (i) learn the sum of all units purchased by their four group members; (ii) the external costs incurred by themselves and their four group members together plus their total payoff; and (iii) the sum of payoffs of their four group members. In the case of the *Tax policy*, they also learn the amount of taxes paid by themselves and their four group members, as well as the amount redistributed to them and their four group members.

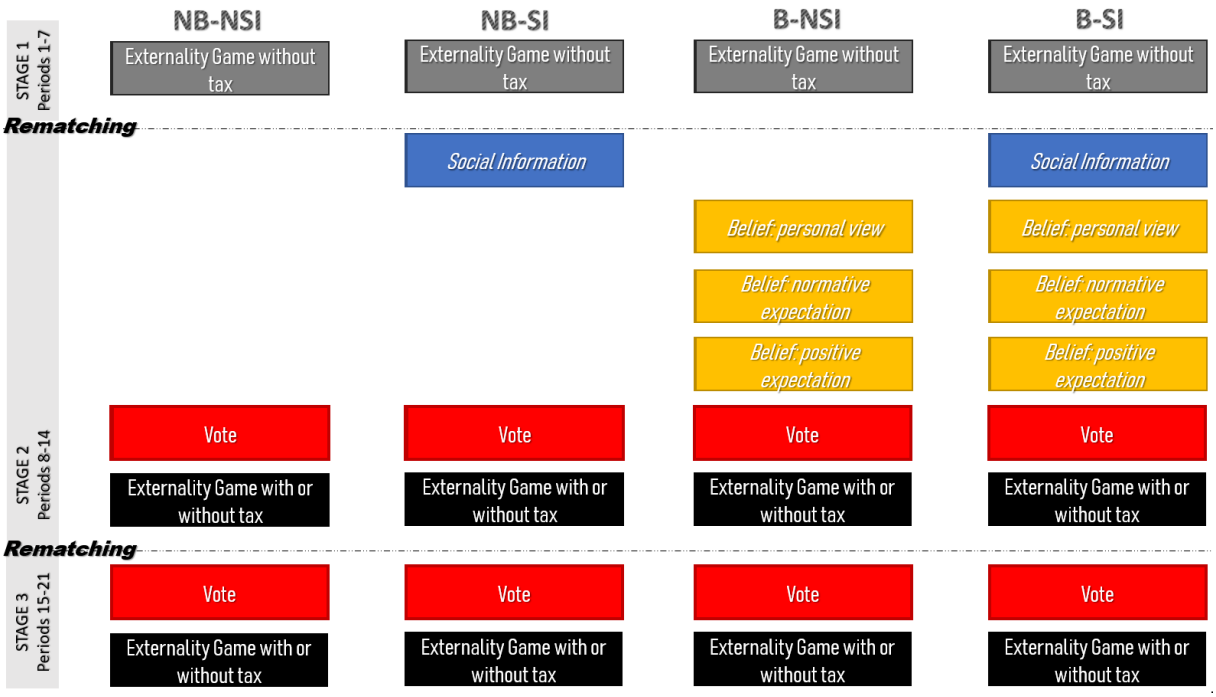
2.4 Treatments

Since we are interested in the influence of social information on: (i) public support for the Tax policy (i.e., votes); and (ii) beliefs related to public support for the tax, we introduce a social information (SI) treatment and a beliefs elicitation (B) treatment. Overall, we consider a 2×2 between-subject design. The four conditions, also presented in Figure 2, are:

1. No Beliefs - No Social Information (NB-NSI)
2. No Beliefs - Social Information (NB-SI)

3. Beliefs - No Social Information (B-NSI)
4. Beliefs - Social Information (B-SI)

Figure 2: Overview of the full experiment

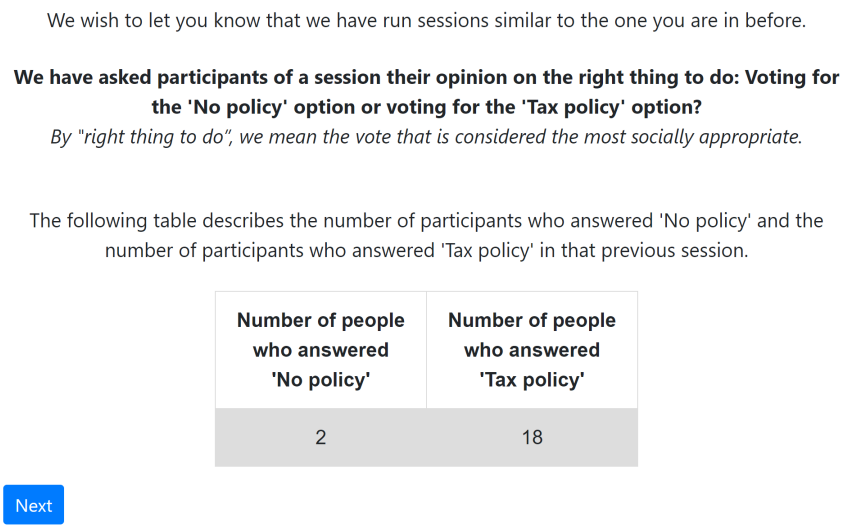


The comparison of treatments NB-NSI and NB-SI allows us to investigate whether there is a (causal) influence of social information on votes, and to what extent (i.e., our first research question). The comparison of treatments B-NSI and B-SI allows us to study whether there is a (causal) influence of social information on beliefs, and to what extent (i.e., our second research question).

In the two beliefs treatments, we elicit three sets of beliefs in a similar way to that of d'Adda et al. (2020):

- Subjects' personal opinions on what is the right thing to do between voting for the 'No policy' option and voting for the 'Tax policy' option. By the "right thing to do", we mean the mostly socially appropriate vote. We ask subjects "In your opinion, what is the right thing to do? Voting for the 'No policy' option or voting for the 'Tax policy' option?";
- Subjects' normative expectations of what others in the same session consider as the right thing to vote for. We ask subjects to guess the number of participants in their session who answered 'No policy' and 'Tax policy' in the first question;
- Subjects' positive expectations of what others in the same session will actually vote. We ask subjects to guess the number of participants in their session who will actually vote 'No policy' and 'Tax policy' in the next step.

Figure 3: Screenshot of the social information treatment



Both normative and positive expectations are incentivised so that subjects earn six tokens if they are exactly right, four tokens if their response has a 1-point difference with the right answer, two tokens if their response has a 2-point difference, and 0 tokens otherwise.[5]

In the two social information treatments, subjects learn about other subjects' personal opinions on the right thing to do between voting for the 'No policy' option and the 'Tax policy' option. More precisely, we use truthful information that comes from one session of treatment B-NSI and favors the tax. We selected the session in which most opinions were in favor of the tax, since our goal is to investigate whether positive opinions on the tax encourage public support for the tax. Providing information that was gathered in a similar session to that in which subjects participate make it credible and reliable information (Haaland et al., 2023); that is, subjects are more likely to trust this information than if we "made up" such social information. To avoid a framing effect, we display both the number of subjects who think the 'No policy' option is the most socially appropriate *and* the number of subjects who think the 'Tax policy' option is the most socially appropriate. Subjects are therefore informed that in their particular session, 18 (resp. 2) subjects believed that voting for the 'Tax policy' option (resp. for the 'No policy' option) was the right thing to do. The exact wording of our social information treatment is reproduced in Fig 3.

There are two reasons for our choice to provide information on personal beliefs, although

[5]Evidence in the literature has highlighted that providing incentives for correct beliefs also allows the mitigation of potential partisan biases, such as being naturally pro- or anti- corrective tax (see the review of Haaland et al., 2023).

the literature generally reports larger effects of information on descriptive beliefs (see e.g. Bicchieri and Dimant, 2022). As put forward by Bénabou and Tirole (2016), "what is optimal for each agent to think depends on what others think" in a group, which constitutes one reason for our choice. Another reason is the potential unavailability of descriptive beliefs in our context. Let us consider carbon taxes. While in our experiment, for example, descriptive beliefs are about how many subjects voted in the session, it is much less obvious in reality, however, to collect descriptive beliefs prior to the implementation of a carbon tax in a country or region.

To address this issue, several solutions are feasible. The first would be to organize a trial period and/or a referendum (Carattini et al., 2018), which has not often been implemented.[6] A second possibility would be that the government implements the policy without prior knowledge of the population's acceptability rates, potentially leading to a Yellow vests-type movement, which in turn would provide insights as to people's (low) public support—although this is not a desirable option. A third possibility is to implement the policy for a part of the population only (e.g., within some municipalities), allowing for the collection of descriptive expectations of the treated populations after experiencing the tax (see e.g. Carattini et al., 2018). However, such a solution requires resources for its implementation and may not be permitted in some countries where a tax should only apply to the whole country.

Therefore, the most convenient and informative solution would be to assess the personal views of a large sample of the population, which could in turn be used as social information (normative expectations) to give back to the wider population at a later stage in the policy cycle.

2.5 Behavioral hypotheses

Our hypotheses relate to the effect of social information on beliefs, votes and purchased quantities, as well as the effect of experiencing the tax in reality on its support.

As discussed previously, evidence in the current literature has emphasized that providing social information to subjects can shape their beliefs (see e.g. Goeschl et al., 2018; d'Adda et al., 2020; Fellner-Röhling et al., 2023). Therefore, our first set of hypotheses is:

Hypothesis 1a *When provided with social information, more subjects believe that implementing the tax is the right thing to do (personal beliefs).*

Hypothesis 1b *When provided with social information, the subjects' normative expectations about the right thing to do (normative beliefs) are higher.*

[6] Although not related to carbon taxes, trialing combined with a referendum has been experienced in the city of Gothenburg (Sweden) in the context of congestion charges (Hansla et al., 2017). Ballots on energy taxes also allowed the Swiss population to give their opinion by means of a referendum that had an impact on implementation (Thalmann, 2004; Carattini et al., 2018).

Hypothesis 1c *When provided with social information, the subjects' positive expectations about other subjects' votes (positive beliefs) are higher.*

Second, evidence in the literature has emphasized that providing social information to individuals has an influence on their behavior (e.g. Alpizar et al., 2008; Shang and Croson, 2009; Gächter et al., 2013; Chen et al., 2017). One reason may be that since people are generally better informed about what others think, they may align their beliefs with others' beliefs and act accordingly (d'Adda et al., 2020). Our next two hypotheses are therefore:

Hypothesis 2 *Providing social information that reflects favorable personal views on the tax increases subjects' votes for its implementation.*

Hypothesis 3 *Subjects' change in beliefs is a causal mechanism for the increased support of the Pigouvian tax.*

One reason that could explain the lack of support for corrective taxes, in addition to tax aversion (Kallbekken et al., 2011), is that individuals generally lack familiarity with these types of instruments (Janusch et al., 2020). However, evidence in the literature has shown that after having experienced corrective taxes, individuals are more likely to support them (e.g. Cherry et al., 2017). Our next hypothesis is therefore:

Hypothesis 4 *Subjects who have experienced the tax more often vote for its implementation during the second vote, compared with those who have not experienced it.*

Finally, and according to the modeling of our corrective tax (in Subsection 2.1), as well as empirical evidence (e.g. Kallbekken et al., 2011; Cherry et al., 2014; Heres et al., 2017; Cherry et al., 2017; Janusch et al., 2020), we expect that the corrective tax is efficient; that is, the number of purchased quantities is reduced when the tax is implemented. Our last hypothesis is therefore:

Hypothesis 5 *The implementation of the tax reduces the number of units purchased.*

2.6 Procedures and implementation

The sessions were conducted at the Vienna Center for Experimental Economics (VCEE) in Vienna in two parts[7]: first, in February-March 2020 and later, in October-November 2022. The experiment was computerized and coded with oTree (Chen et al., 2016).

A total of 960 subjects participated in our experiment (240 per treatment), who are 24.6 years old on average and with 61% of them being women. We implemented 12 sessions per

[7]This was due to the interruption of our experiment following COVID-19-related restrictions. We account for this interruption in our statistical analysis.

treatment (48 in total), with 20 subjects in each session. The participants were divided into two independent groups of 10, resulting in 24 independent observations per treatment. Sessions lasted on average between 1 and 1.5 hours, depending on whether beliefs were elicited or not. Subjects in the beliefs' treatments earned €20.16 on average, and €19.49 otherwise.

At the beginning of each session, subjects were randomly assigned an isolated seat with a computer. Written instructions were provided stage by stage and were read aloud by lab assistants. Understanding of the tasks was tested at the beginning of Stage 1 and Stage 2 (since Stage 3 was similar to Stage 2). Feedback was provided on subjects' wrong answers on the computer, and subjects had the opportunity to ask questions of the lab assistants. The written instructions are provided in Appendix A. Note that the written instructions were the same across all treatments. The treatments were presented directly on the subjects' screens. For the final payoffs, the computer randomly selected one period among the 21 periods of the experiment, and subjects were paid according to their gains in this period, in addition to the potential bonuses they earned in the beliefs elicitation treatments. At the end of the experiment, a lab assistant spoke to each subject and paid them a private amount (a minimum of €10 was set).

3 Results

3.1 Influence of social information provision on subjects' beliefs

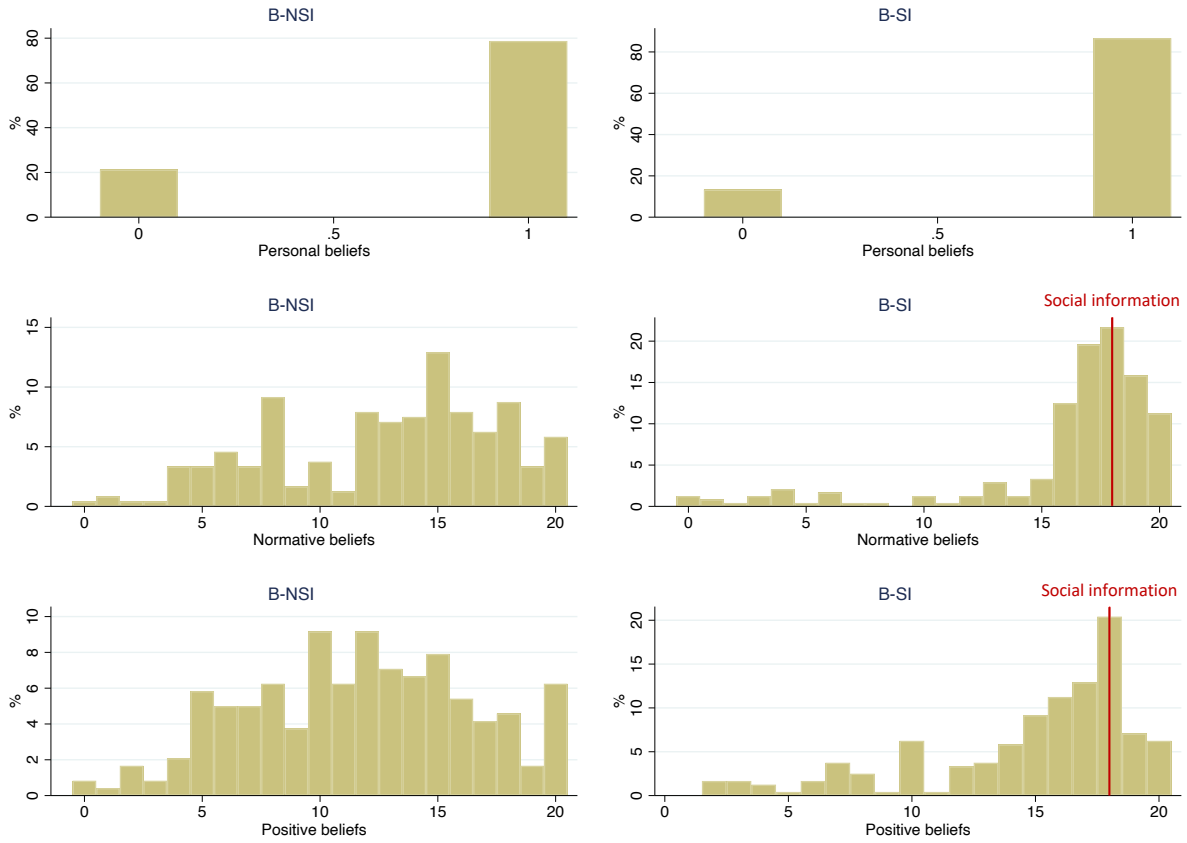
We start our analysis with the effect of providing social information on subjects' beliefs to test Hyp. 1a, 1b and 1c. In Table I, we report the share of subjects who believe that implementing the tax is the right thing to do (personal belief), as well as the average of normative and positive beliefs. We also report the results of a proportion test (to compare the share of personal beliefs between treatments B-NSI and B-SI) and of T-tests (to compare the normative and positive beliefs between treatments B-NSI and B-SI).

Table I: Descriptive statistics regarding subjects' beliefs

Treatment	Personal beliefs	Normative beliefs	Positive beliefs
B-NSI	78.75%	12.80	11.64
B-SI	86.67%	16.18	14.77
Test	Proportion test $p\text{-}value = 0.022$	T-test $p\text{-}value < 0.01$	T-test $p\text{-}value < 0.01$

We observe that whatever the type of belief, when subjects are provided with social information in favor of the tax (treatment B-SI), subjects' beliefs are significantly influenced upward. Note also that in both treatments, the positive beliefs are lower than the normative

Figure 4: Distribution of normative and positive beliefs depending on the treatment



ones. This could be an illustration of the intention-action gap: although subjects believe that most of the other participants think that implementing the tax is the right thing to do, at the same time they do not believe that all of them will actually vote for the tax.

To gain further understanding, we present in Fig. 4 the distributions of the three types of belief for the treatments B-NSI and B-SI. Regarding personal beliefs, and in line with our previous observation, we observe an increase in the share of subjects who believe that voting for the tax is the right thing to do when social information is disclosed. In the absence of social information, the distribution of normative beliefs is centered around 8 and 15, while the distribution for positive beliefs is centered in the 10-12 region. However, when social information is provided, the distribution for both types of beliefs is shifted to the right and centered around 18 (i.e., the value of the social information that is disclosed). Conducting two-sample Kolmogorov–Smirnov tests to assess the effect of providing social information on the distributions of normative and positive beliefs, we conclude to a significant difference (*p-value* < 0.01 for both types of beliefs).

In Appendix B, we provide some econometric analyses to assess the determinants of the subjects' beliefs. We confirm that providing social information influences subjects' beliefs. We also find that subjects who are used to vote in reality are more likely to believe that voting for the tax is the right thing to do (personal belief), and that they hold higher positive beliefs.

Overall, these observations support our first result.

Result 1: We find evidence in favor of **H1a**, **H1b** and **H1c**; that is, providing social information influences subjects' beliefs.

3.2 Influence of social information provision on subjects' votes

Next, we assess whether providing subjects with social information makes them vote more often for the implementation of the tax (to test Hyp. 2).

From a general point of view, and abstracting from the treatments, 74.06% of subjects voted in favor of tax implementation during the first vote, which leads to 167 groups out of the 192 being taxed between periods 8 and 14. Regarding the second vote, 78.23% of the subjects voted in favor of tax implementation, and 176 groups out of the 192 were taxed between periods 15 and 21.

As discussed previously with regard to our experimental design, the clean way to assess the causal effect of social information provision on subjects' votes is to compare treatments NB-NSI and NB-SI. Indeed, we cannot exclude that beliefs elicitation in treatments B-NSI and B-SI affects subjects' voting behavior through, for instance, a priming effect (Stantcheva, 2023), information overload (Persson, 2018) or fatigue (Jeong et al., 2023), given the longer experiments when beliefs are elicited. Therefore, although we account for both comparisons (NB-NSI vs NB-SI and B-NSI vs B-SI) in Table II, one should keep in mind that additional effects, such as priming or information effects, could impact the vote in treatments with beliefs elicitation.

We report in Table II the share of subjects voting in favor of the tax (for the first vote only), per treatment.[8] When beliefs are not elicited, we observe that 70.83% of subjects voted in favor of tax implementation in the NB-NSI treatment, while 78.33% voted in favor of tax implementation in treatment NB-SI. Conducting a proportion test, this corresponds to a significant difference at the 5% level (one-sided test, *p-value* = 0.0296). Turning to treatments with beliefs elicitation, we observe that 70.83% of the subjects voted in favor of tax implementation in the B-NSI treatment, while 76.25% of them voted in favor of tax implementation in the B-SI treatment. Conducting a proportion test, this corresponds to a significant difference, but at the 10% level only (one-sided test, *p-value* = 0.0893), which suggests a potential priming effect, information overload or fatigue. We further discuss this point in Section 3.4 and in Appendix C.

This leads to our next result:

[8] We do not consider the second vote as it is more difficult to isolate the effect of beliefs. Indeed, the second vote could be influenced by subjects' experiences with/without the tax, and/or their first vote.

Table II: Share of subjects voting in favor of the tax (first vote) per treatment

	No social information (NSI)	Social information (SI)	Proportion test* (p-value)
No beliefs elicitation (NB)	70.83%	78.83%	0.0296
Beliefs elicitation (B)	70.83%	76.25%	0.0893

* One-sided proportion test.

Result 2: We find evidence in favor of **H2**; that is, providing social information influences subjects' first vote.

3.3 Subjects' experience with the tax and voting behavior

We next focus on the subjects' second vote and, in particular, on the extent to which experiencing the tax during periods 8 to 14 influences subjects' votes (to test Hyp. 4). In Table III, we report the shares of subjects voting (or not) for the tax, depending on whether or not they have experienced it (abstracting from any treatment).

Table III: Share of subjects supporting the tax depending on their experience with the tax

	Subjects who have...	
Second vote	not experienced the tax	experienced the tax
Against the tax	49.60%	17.60%
In favor of the tax	50.40%	82.40%
χ^2 test	$p\text{-}value < 0.01$	

We observe a clear difference between those who have, or have not, experienced the tax. Specifically, while the votes of those who have not experienced it are almost equally split between votes in favor and against the tax, 82% of those who have experienced it voted in favor of the tax during the second vote. This represents a more than 30 percentage points difference compared to those who voted for it but did not experience it. Conducting a chi-square test, we observe a significant difference (at the 1% level) in terms of voting behavior between those who have and those who have not experienced the tax.

In Table IV, we propose a different analysis focusing on the shares of subjects voting in favor of/against tax implementation during the second vote, depending on the decision made during the first vote (abstracting from any treatment). We observe an even more polarized dichotomy: almost two-thirds of subjects who voted against tax implementation during the first vote also voted against it during the second vote, while more than 90% of those who were

initially in favor of its implementation were also in favor of it during the second vote (this again corresponds to a significant difference at the 1% level).

Table IV: Share of subjects supporting the tax depending on their experience with the tax

	First vote	
Second vote	Against the tax	In favor of the tax
Against the tax	60.24%	8.30%
In favor of the tax	39.76%	91.70%
χ^2 test	*p-value* < 0.01	

These observations lead to our next result:

Result 3: We find evidence in favor of **H4**; that is, subjects who have experienced the tax more often vote for its implementation compared to those who have not experienced it.

3.4 Econometric analysis

The previous analyses do not allow for us to account for the characteristics of the subjects. We therefore turn to some econometric analyses. We focus here on the determinants of subjects' votes and analyze them using a Probit approach. Specifically, we estimate the following equation:

$$Vote_{it}^{*} = \beta \cdot X + \varepsilon_{it}$$

where $vote_{it}$ is subject i's vote (equal to 1 if the subject is in favor of tax implementation) in referendum $t \in \{1;2\}$, X is the set of explanatory variables, and ε_{it} is the error term. This equation is estimated separately for the first (models 1 and 2) and the second vote (models 3 and 4). Moreover, given that our main objective is to assess the causal effect of social information provision on subjects' support for the tax, we consider separately treatments without beliefs elicitation (models 1 and 3) and those with beliefs elicitation (models 2 and 4). This approach thus allows us to assess in a clean way the causal effect of providing social information on subjects' votes.

As explanatory variables, we first consider the dummies *NB-SI* and *B-SI*, that are equal to one if the subject received the corresponding treatment (the reference categories are *NB-NSI* and *B-NSI*, respectively). In model (3), which is estimated to explain the second vote of subjects, we also control for both tax support during the first vote, with the dummy *Supported tax (vote 1)*, and for tax experience, with the dummy *Taxed in per. 8 to 14*.

Finally, models (2) and (4) are replications of models (1) and (3), respectively, with additional control variables: (i) a dummy *Norm importance*, equal to one for subjects who indicate in the questionnaire at the end of the experiment that conforming to the behavior of their peers matters to them[9]; (ii) a dummy *Used to vote*[10], equal to one for subjects who indicate that they often or always go to vote when there is a referendum; and (iii) a dummy *Post COVID*, equal to one for subjects who participated in the experiment in 2022 after the COVID-19 period. Although not reported, we also control in all estimations for subjects' university background, age, and gender. The results are reported in Table V.

Regarding the first vote, and in line with our previous results, we observe in model (1) that subjects who received social information without having their beliefs elicited (treatment *NB-SI*) voted significantly more for the tax (at the 5% level) compared to those who did not receive social information (treatment *NB-NSI*). While the effect of social information on votes cannot be cleanly isolated in the presence of beliefs elicitation (due to, for instance, a potential priming effect, information overload or fatigue), we also detect a significant effect of the provision of social information on subjects' first vote in model (2), but again, only at the 10% level. In both models (1) and (2), we also observe that those who participated in the experiment in 2022 (after the start of the COVID-19 pandemic) vote significantly less for the tax than those who participated before the pandemic (at the 5% level).

Regarding the second vote, model (3) confirms our previous results on the effect of experiencing the tax on its support (positive and significant coefficient at the 1% level). Moreover, we again find in both models (3) and (4) that subjects who voted in favor of the tax during the first vote are more likely to vote for it during the second vote (positive and significant coefficient at the 1% level).

Overall, these estimations confirm that: (i) providing social information may improve tax support; (ii) there is a form of inertia in subjects' votes (those who voted in favor of the tax implementation the first time are more likely to vote for it again); and (iii) experiencing the tax may increase the likelihood to vote for its implementation during the second vote.

In line with the results in Section 3.2, model (2) confirms that the effect of social information provision on subjects' votes is mitigated, compared to treatments without beliefs being elicited. As discussed previously, this mitigated effect may come from: (i) a potential priming effect from beliefs elicitation (i.e., the fact of asking subjects about their beliefs is a treatment in itself, as it pushes subjects to reflect on tax implementation); (ii) information overload (i.e.,

[9]We have asked subjects the following question: "What matters the most to you? [a) That my behavior is in line with what others think is the most appropriate; b) That my behavior is in line with what others effectively do; Both a) and b) equally matter; None of a) and b) matter; Undecided]". The dummy *Norm importance* is equal to 1 if the subjects answer "Both a) and b) equally matter".

[10]We have asked subjects the following the question: "When there are referendums in your country, do you usually vote? [Never; Almost never; Half of the time; Often; Always]". The dummy *Used to vote* is equal to 1 if subjects answer "Often" or "Always".

Table V: Probit estimates of voting models

	First vote		Second vote	
	(1)	(2)	(3)	(4)
NB-NSI	*Ref.*		*Ref.*	
NB-SI	0.274**		0.197	
	(0.116)		(0.131)	
B-NSI		*Ref.*		*Ref.*
B-SI		0.237*		0.168
		(0.124)		(0.186)
Supported tax (vote 1)			1.283***	1.945***
			(0.136)	(0.192)
Group is taxed in per. 8 to 14			0.595***	0.0924
			(0.221)	(0.195)
Norm importance	-0.168	0.0908	-0.0614	0.236
	(0.125)	(0.149)	(0.173)	(0.213)
Used to vote	0.237	0.154	0.360**	0.247
	(0.164)	(0.113)	(0.155)	(0.153)
Post COVID	-0.237**	-0.283**	0.0214	-0.0156
	(0.119)	(0.135)	(0.127)	(0.198)
Constant	1.032***	0.898***	-0.269	-1.330***
	(0.371)	(0.304)	(0.334)	(0.510)
Observations	480	480	480	480
Number of clusters	48	48	48	48
Log-likelihood	-265.0	-272.6	-196.5	-152.5
Wald χ^2	18.35	13.88	133.8	154.3
Prob. $> \chi^2$	0.0105	0.0534	0.0000	0.0000

We estimate Probit models to assess the determinants of voting behavior when social information is provided. We focus on the first vote in models (1) and (2), while we focus on the second one in models (3) and (4). In models (1) and (3), we compare subjects in treatments *NB-NSI* and *NB-SI*, while we compare subjects in treatments *B-NSI* and *B-SI* in models (2) and (4). All estimations include variables for the subject's age, gender and background. Clustered standard errors (at the sub-session level) in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

the fact of asking subjects about their beliefs, *and* providing them with social information, *plus* asking them to vote is "too much" information for subjects); and (iii) "fatigue" (i.e., the fact that treatments with beliefs lengthen the experiment compared with treatments without beliefs). Although our experimental design is not adapted to test for information overload, fatigue or any other effect, we can still discuss the existence of a priming effect. In Appendix C, we report additional analyses where we replicate the analyses reported in Table V to further examine the effect of beliefs elicitation on subjects' votes (i.e., we compare treatments NB-NSI and B-NSI,

and NB-SI and B-SI). We observe an absence of any effect of beliefs elicitation on subjects' votes, thus confirming that subjects' changes in voting behavior are due to the disclosure of social information. These additional analyses therefore confirm an absence of any priming effect resulting from beliefs elicitation, which suggests that the mitigated effect of social information on subjects' votes when beliefs are elicited may be due, for instance, to information overload or fatigue. More research on this issue would be necessary.

3.5 Mediation analysis

We have demonstrated the existence of a causal effect of the social information provision on subjects' votes in favor of the Pigouvian tax. We now offer insights about one further potential causal mechanism; that is, the role of beliefs in explaining subjects' votes (to test Hyp. 3).

A natural way to do this is to consider an instrumental variable (IV) analysis to better understand the channels for the effects of our treatments. However, IV analyses rely on strong assumptions, such as the exclusion restriction assumption, which is often difficult to satisfy. We therefore rely on a mediation analysis, which, in addition to relaxing this assumption, allows us to decompose the total effect into *direct* and *indirect* effects (see e.g., Celli, 2022, for a recent review). Specifically, we estimate the following mediation model focusing on treatments B-NSI and B-SI:

$$Vote_{i1} = \beta_0 + \beta_1 Belief_{ik} + \beta_2 T_i + \varepsilon_i \tag{3}$$

$$Belief_{ik} = \alpha_0 + \alpha_1 T_i + \nu_i \tag{4}$$

where $Vote_{i1}$ is subject i's first vote, $Belief_{ik}$ is subject i's belief on dimension k (personal, normative or positive belief), T_i is a dummy equal to 1 if social information is provided, β_0 and α_0 are constant terms, and ε_i and ν_i are error terms. We focus on the first vote only as the second one is also influenced by the subjects' previous vote (see Table V), which makes it difficult to isolate the effect of the mediator (beliefs in our case).

Using this setting, the total effect of social information provision on subjects' votes is

$$\tau = E[Vote_{i1}(1)] - E[Vote_{i1}(0)] = E[Vote_{i1}(1, Belief_{ik}(1))] - E[Vote_{i1}(0, Belief_{ik}(0))], \tag{5}$$

the (natural) indirect effect; that is, the effect of social information provision on subjects' votes through a change in beliefs, is

$$\delta(T_i) = E[Vote_{i1}(T_i, Belief_{ik}(1))] - E[Vote_{i1}(T_i, Belief_{ik}(0))], \quad T_i \in \{0,1\} \tag{6}$$

and the (natural) direct effect; that is, the effect of social information provision on subjects'

votes, is

$$\kappa(T_i) = E[Vote_{i1}(1, Belief_{ik}(T_i))] - E[Vote_{i1}(0, Belief_{ik}(T_i))], \quad T_i \in \{0,1\} \tag{7}$$

where $Vote_{i1}(1)$ and $Vote_{i1}(0)$ are subject i's vote when being treated or not, respectively; and $Belief_{ik}(1)$ and $Belief_{ik}(0)$ are subject i's beliefs on dimension k when being treated or not, respectively.

It should be noted that subjects' normative beliefs are strongly and significantly correlated with both their personal beliefs ($\rho = 0.454$, $p\text{-}value < 0.01$) and their positive beliefs ($\rho = 0.536$, $p\text{-}value < 0.01$). In the mediation analysis, we thus only account for subjects' normative beliefs as the way in which social information provision has an effect. Estimates of direct, indirect, and total effects are reported in Table VI.

Table VI: Direct, indirect and total effects of social information provision on subjects' first vote with normative beliefs as the mediator

	Coefficient	Standard Error	95% confidence interval
Indirect effect ($\delta(T_i)$)	0.0702***	0.0236	[0.0238;0.1165]
Direct effect ($\kappa(T_i)$)	0.0075	0.0478	[-0.0862;0.1013]
Total effect (τ)	0.0777**	0.0384	[0.0024;0.1530]
Observations	480		
Number of clusters	48		

This table reports the results of the estimation of the system of Eq. (3) and (4) with subjects from treatments B-NSI and B-SI, relying on a linear approach. In Eq. (3) we also control for the following variables: *Norm importance*, *Used to vote*, *Post COVID*, *Age*, *Gender* and *Background*. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The results reveal a positive and significant indirect effect, while we do not detect any significant direct effect. Specifically, the shift in subjects' normative beliefs due to the provision of social information leads to a seven percentage point increase in support for tax implementation, which is a result observed at the 1% significance level. This indirect effect constitutes a substantial 90% of the total effect, which remains statistically significant at the 5% level. Overall, the results of the mediation analysis confirm that subjects' beliefs are the causal mechanism through which social information affects subjects' (first) vote.

Result 4: We find evidence in favor of **H3**: the change in subjects' beliefs is the causal mechanism that explains the increased support for the Pigouvian tax.

3.6 Tax effectiveness

Finally, we assess the effectiveness of the tax in reducing the number of purchased units (to test Hyp. 5). We first present in Fig. 5 the evolution of the average individual purchases per period

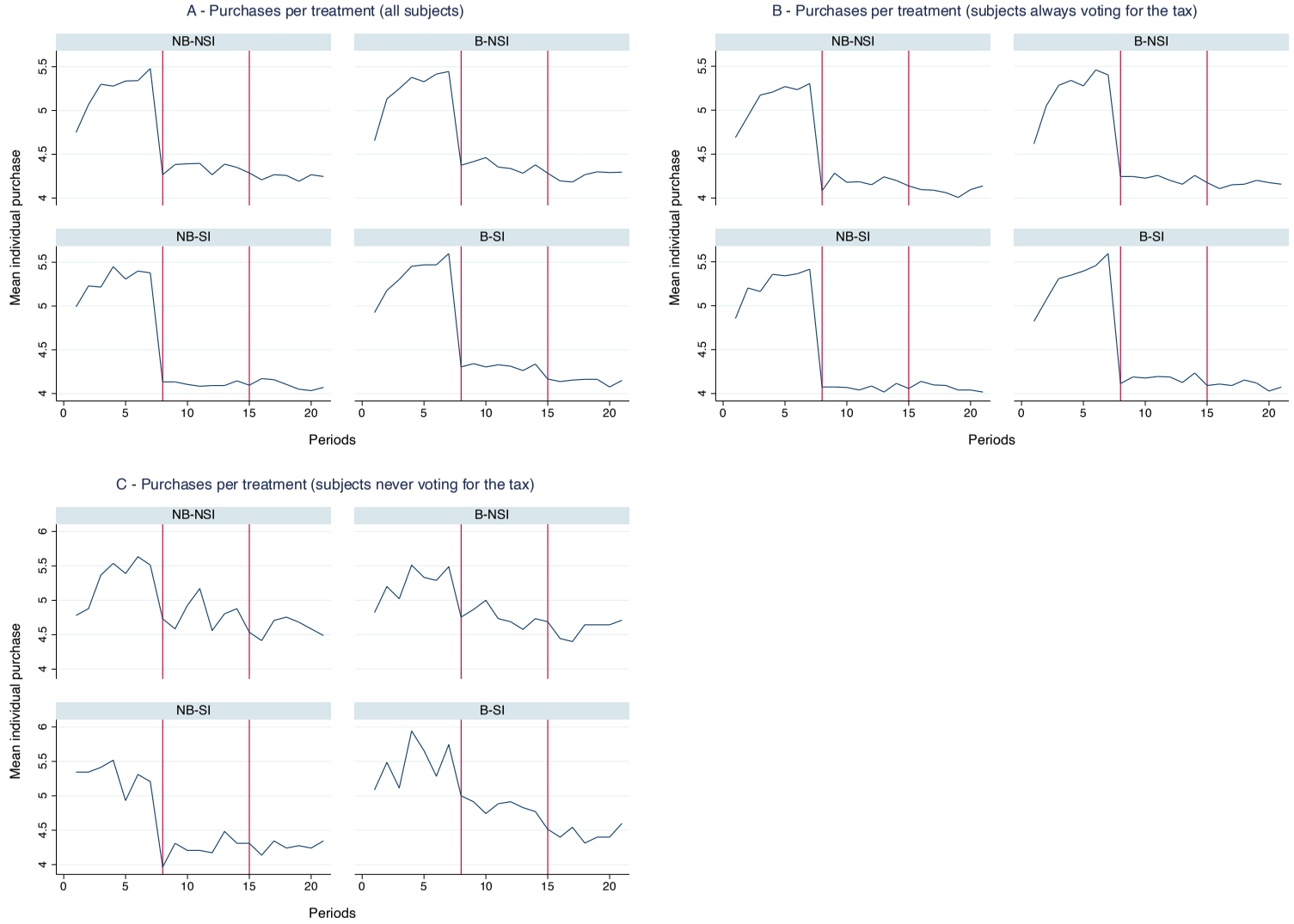
and per treatment.

In Panel A, we consider all subjects. We observe that the average individual purchases before the first vote are generally higher than five units, regardless of the treatment. This observation is not surprising and is close to the theoretical prediction of six units bought per subject, ignoring the negative externality.[11] However, after the first vote, and up to the last period of the game, the average individual purchases are generally lower than 4.5 units and tend to four units, which is the socially optimal number of purchased units. Bearing in mind our past observations that a high number of groups were actually taxed from period 8 (as the result of the votes), this suggests that the tax is effective in reducing the number of purchased units.

To gain further understanding, we separate those who always voted for the tax (Panel B) from those who never voted for it (Panel C). Although the behavior of both groups is similar before the first vote, we observe a clear difference after the first vote. Specifically, while the average individual purchases are very close to four units for those who voted for the tax (Panel B), the average individual purchases of those who did not vote for its implementation are more chaotic and close to 4.5 units, with a downward trend as the game approaches its end.

[11] Recall that the sixth unit is the last one to provide a positive benefit to subjects with a market price of 38.

Figure 5: Average purchases per period and per treatment with all data (Panel A), those always voting for the tax (Panel B) and those who never voted for the tax (Panel C)



To confirm our observations, we analyze individual purchases with Tobit estimations (as subjects could choose to purchase between zero and eight units). Since we are interested in assessing the effect of the tax on individual purchases, we focus on periods 8 to 21 only. We estimate the following equation:

$$Purchase_{it} = \gamma \cdot X + \varepsilon_{it}$$

where $purchase_{it}$ is subject i's level of purchased units in period t, X is the set of explanatory variables, and ε_{it} is the error term. As explanatory variables, we consider the following variables: (i) *Always protested*, a dummy equal to one if the subject never voted in favor of tax implementation during the two votes, to capture the effect of subjects' lack of support for the tax on the number of purchased units;[12] and (ii) *Group is taxed*, a dummy equal to one if the group is taxed, to assess the effect of tax implementation on the individual number of purchased units. The interaction between these two dummies thus allows us to control for the difference in subjects' support for the tax, while being taxed or not. We also control for the *Period* and for the treatments (using the same variables as in our previous analyses), in addition to the same control variables previously considered in Table V. The results are reported in Table VII.

We follow the same approach as in Table V: Even if we do not expect to find any effect of the treatments on the purchased quantities, in model (1) we focus on treatments *NB-NSI* and *NB-SI*, while we focus on treatments *B-NSI* and *B-SI* in model (2). This approach allows us to provide a clean explanation of the purchases of the subjects in our experiment, taking into account the differences between our treatments. In Appendix C, we replicate these analyses comparing treatments *NB-NSI* and *B-NSI*, and treatments *NB-SI* and *B-SI*. The results are qualitatively the same as the ones we discuss here.

As expected, we observe in both models that subjects in groups where the tax is implemented significantly purchase less units (between 1.4 and 1.5 units less in models (1) and (2), respectively), compared to other subjects who are not taxed (significant at the 1% level in both models). Moreover, when considering the interaction between those who never voted in favor of the tax during both votes (variable *Always protested*) and having the tax implemented in the group (variable *Group is taxed*), the coefficient is not significant. This indicates that the tax is efficient, even when subjects strongly reject it. We also observe, in model (2) only, that the number of units purchased decreases over time, the variable *Period* being negative and significant (at the 5% level). This suggests that subjects tend to decrease free-riding over time (purchasing less and less units over time). Finally, we do not detect any effect of the treatments or of the control variables.

Overall, we observe a robust effect of the tax when implemented, allowing for a reduction of

[12] When subjects vote at least once in favor of tax implementation they are therefore considered as a *Tax supporter* in our estimations.

Table VII: Tobit estimates of individual decisions about purchased units

	(1)	(2)
NB-NSI	*Ref.*	
NB-SI	-0.027	
	(0.035)	
B-NSI		*Ref.*
B-SI		-0.022
		(0.040)
Period	-0.003	-0.006**
	(0.003)	(0.002)
Always protested	0.095	0.127*
	(0.113)	(0.076)
Group is taxed	-1.402***	-1.531***
	(0.068)	(0.082)
Tax supporter×Group is taxed	0.042	0.047
	(0.066)	(0.061)
Always protested×Group is taxed	-0.066	0.016
	(0.102)	(0.102)
Norm importance	-0.023	0.002
	(0.036)	(0.051)
Used to vote	-0.019	0.042
	(0.043)	(0.038)
Post COVID	-0.040	0.003
	(0.036)	(0.041)
Constant	5.561***	5.475***
	(0.134)	(0.203)
Observations	6720	6720
Number of clusters	48	48
Log-likelihood	-7559.2	-7694.9
Pseudo R^2	0.1122	0.1350

We estimate Tobit models to assess the determinants of purchasing behavior when social information is provided. In model (1) we compare subjects in treatments *NB-NSI* and *NB-SI*, while in model (2) we compare subjects in treatments *B-NSI* and *B-SI*. All estimations include variables for the subject's age, gender and background. Clustered standard errors (at the sub-session level) in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

1.4-1.5 purchased units. From an experimental point of view, this result confirms that subjects understood the rules, as well as the role of the tax. In addition, we confirm that the tax is efficient, whether or not social information was provided. This could be expected, as social information was supposed to have an effect on votes, not on purchases.

These observations lead to our last result:

Result 5: We find evidence in favor of **H5**; that is, the tax is an effective tool to reduce the number of purchased units and, therefore, the negative externality.

3.7 Robustness checks

In Appendix D, we replicate the econometric analyzes reported in this study focusing only on the subjects who participated in our experiment in 2022. The rationale for these additional analyses is that, in Table V, we observe a 'COVID-19 effect': those who participated in our experiment in 2022 are less likely to vote for tax implementation. We therefore aim at assessing the robustness of our analyses focusing on the subjects from 2022 only.

Regarding voting behavior, the results are qualitatively the same, except that we no longer detect any effect of the provision of social information on the votes of the subjects when beliefs are elicited (see model (2) in Table XII). As a consequence, and although we detect a significant indirect effect with our additional mediation analysis, we no longer detect any significant total effect (see Table XIV). Regarding individual purchases, the results are again qualitatively the same, except that we now detect that subjects who always protested (that is, who never voted for tax implementation) purchase significantly more units compared to the others, but only when beliefs were elicited (see model (2) in Table XV).

Overall, we therefore observe the stability of the results reported in this study.

4 Discussion and conclusions

In this paper, we propose a laboratory experiment with an original design to: (i) assess whether it is possible to foster public support for externality-correcting taxes; and (ii) to understand the causal mechanism underlying the effect of social information on public support through personal beliefs.

Our first contribution is related to the use of social information to foster subjects' support for corrective-externality taxes. Overall, we find that providing subjects with social information does improve subjects' support for the Pigouvian tax. This result is in line with the existing literature that emphasizes the effect of social information on agents' behavior (e.g., Alpizar et al., 2008; Shang and Croson, 2009; Goeschl et al., 2018). In addition, we demonstrate that the change in subjects' beliefs is a causal mechanism that explains this increased support.

We also demonstrate that the effect of social information provision on subjects' votes in favor of tax implementation is attenuated when beliefs are elicited. Our analyses allow us to show that beliefs are not responsible for a form of priming effect, which opens the possibil-

ity for information overload or survey fatigue: asking individuals about their beliefs and to provide social information may be "too much", in the sense that this cancels out the effect of social information. Although more research is needed on this issue, it raises interesting questions for policymakers in terms of the implementation of solutions to foster the acceptability of corrective externality taxes.

A surprising result regarding votes is that subjects who participated in our experiment after the COVID-19 pandemic are less likely to vote in favor of tax implementation. Our experiment was not designed to investigate this issue, and we can only offer hypotheses as to this result. With the multitude of COVID-19 pandemic restrictions in place at the time (stay-at-home measures, the obligation to wear a mask, social isolation, etc.), subjects may have perceived the implementation of the tax as an *additional restriction* that they wanted to avoid. This might explain the decreased support for an instrument that provides subjects with the incentive to behave in a certain way. Nevertheless, this unexpected result may contribute to the literature on the determinants of the acceptability of such taxes, in particular regarding the carbon tax (e.g., Dechezleprêtre et al., 2022; Douenne and Fabre, 2022).

The second contribution of our work shows that from the first vote, a fairly large majority of subjects, between 70% and 78%, are in favor of tax implementation. These shares exceed by around 20 percentage points those observed in recent experiments on the acceptability of corrective taxes (e.g., Cherry et al., 2017; Janusch et al., 2020), but are close to the shares observed in Heres et al. (2017) when full information about revenue recycling is available (73% of votes supporting tax implementation). In line with the existing literature, we also emphasize that subjects who have already experienced the tax are more likely to vote for its implementation during the second vote. Following (Cherry et al., 2014), this result suggests that some subjects might be biased against tax implementation during the first vote, but that experiencing it improves their perception of it and, therefore, encourages them to support it during the second vote.

Our last contribution is that tax implementation significantly reduces the number of units purchased, in line with the existing literature (e.g., Kallbekken et al., 2011; Cherry et al., 2014; Heres et al., 2017). Although not surprising, this result can also be seen as a confirmation that subjects have understood the rules of our market game.

In general, our study directly contributes to the economic literature on the acceptability of corrective taxes. However, we acknowledge that the behavior in our sample of subjects might provide bounds on the behaviour of other populations of interest (Snowberg and Yariv, 2021). A first step in this direction could be to run the same experiment with a representative population of one or several countries that have already undergone, or may undergo in the future, such a corrective tax imposed by the government. Studying the mechanism difference between a population that is familiar with such taxes and a population that is not would be an interesting

comparison to further test whether motivated reasoning could be the key to our results.

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Appendices

A Instructions

Welcome

You are going to participate in an experiment on decision-making. The rules are simple.

All your decisions will be treated anonymously. You will enter your decisions on the computer.

This experiment comprises 3 stages. These instructions are for the first stage. You will receive the instructions for the second stage after the end of the first stage. In each stage, you will play the same game for seven periods.

At the end of the experiment, one stage out of the 3 will be randomly selected, and then one period of that stage will be randomly selected for payment. Then, we will call you individually for your payment.

From now on, we ask you not to communicate with any of the other participants in this room. If you have any questions, please raise your hand and an experimenter will come to answer you privately.

First stage

You are going to play a market game during 7 periods in which you, and the other participants in this room, will be buyers. All transactions will be expressed in tokens, with 1 token = 0.30 euros.

In this first stage, you are going to play in groups of 5 participants (you included). Each group will be randomly composed. You will stay in the same group during the 7 periods of this stage, that is, your group will not change during these 7 periods.

Your role :

Your role will be to decide how many units you want to buy from an automated seller (the computer). You can buy up to 8 units. Each unit has a different value. The first unit has the highest value and the last unit has the lowest one. These values are : 85, 70, 60, 55, 45, 40, 30 and 15 tokens And are the same for all buyers.

The automated seller charges the same price of 38 tokens for each unit purchased. This price is the same for each unit and for all buyers.

In the following table, the units are ranked in decreasing order. The first unit has a value of 85. When buying this unit, you pay 38 tokens. Your net gain when buying this unit is therefore

: 85 – 38 = 47 tokens. Similarly, your net gain if you decide to buy the second unit is : 70 – 38 = 32 tokens.

Unit number	Value	Net gain for the considered unit (= Value - Price)
Unit 1	85	47
Unit 2	70	32
Unit 3	60	22
Unit 4	55	17
Unit 5	45	7
Unit 6	40	2
Unit 7	30	-8
Unit 8	15	-23

Your net gain from purchasing units is the sum of all net gains from the purchased units.

Example 1: If you decide to buy 5 units, your total gain is : 47 + 32 + 22 + 17 + 7 = 125 tokens.

Example 2: If you decide to buy 7 units, your total gain is : 47 + 32 + 22 + 17 + 7 + 2 - 8 = 119 tokens.

Cost related to purchases :

However, each time you decide to buy one unit, a cost of 3 tokens will be imposed on each of the four other members of your group. This additional cost will be subtracted from their payoffs. Note that each time you buy one unit, you are not affected by this cost of 3 tokens per unit bought.

In turn, each time another member of your group buys one unit, you will be affected by this cost of 3 tokens per unit bought that will be subtracted from your payoff.

Your final payoff is therefore determined as follows:

Final payoff = sum of the net gain from each unit bought – sum of the additional cost imposed by the purchases of the four other members of your group

Note that if you decide not to buy any units, you may still incur the additional costs imposed by the purchases of the four other members of your group. In that case, your final payoff would be negative.

Example 3 : Assume that you decided to buy 2 units. Your gain is therefore 47 + 32 = 79. Your choice to buy 2 units will impose on each of the four other members of your group a loss of 2 x 3 = 6 tokens. Now, assume that the four other members of your group have purchased a total of 11 units. It will cost you 11 x 3 = 33 tokens. Your final payoff is therefore : 79 – 33 = 46 tokens.

To help you in your decisions, below you will find a table summarizing your possible payoff depending on the number of units you buy and on the total number of units bought by the other members of your group.

Figure 6: Payoff table for "No policy"

		YOUR FOUR GROUP MEMBERS (total)							
	Purchased units	**4**	**8**	**12**	**16**	**20**	**24**	**28**	**32**
YOU	**1**	35	23	11	-1	-13	-25	-37	-49
	2	67	55	43	31	19	7	-5	-17
	3	89	77	65	53	41	29	17	5
	4	106	94	82	70	58	46	34	22
	5	113	101	89	77	65	53	41	29
	6	115	103	91	79	67	55	43	31
	7	107	95	83	71	59	47	35	23
	8	84	72	60	48	36	24	12	0

Before the start of this stage, you will have to answer some understanding questions. Now you can follow the instructions on your computer.

Second stage

You are now going to play for another 7 periods.

However, before playing this market game, two changes will occur :

1. You are going to be rematched in a new group of 5 subjects. The groups being randomly composed, it may be the case that you have already played with some of the other group members. In any case, you will never know the exact identity of the other members of the group and you will not know if you have already played with them.

2. Before playing this market game, you will have to vote between 2 policy options (described below). The option that will receive the majority of votes, that is, at least 3 votes, will be implemented for the 7 periods of this second stage.

We are now going to describe the two policies.

No policy : this option refers to the game you have played in the first stage. In other word, if this policy is implemented, then the market game will be exactly the same than the one you played in the previous stage.

Tax policy : This option adds a tax per unit purchased equal to 12 tokens. In other words, each time you purchase one unit, you will pay 12 tokens in addition to the price of 38 tokens. This also holds for the other buyers in your group. At the end of each period, the total amount of tax collected will be redistributed equally between all buyers in your group; that is, each group member will receive 1/5 of the total amount of tax collected. The objective of this tax is not to raise revenues. It is to make buyers take into account the fact that when buying one unit, they impose an additional cost on the other buyers.

Your final payoff with the tax policy is determined as follows:

Final payoff = sum of the net gain from each unit bought – sum of tax payed per unit purchased – sum of the additional cost imposed by the purchases of the four other members of your group + 1/5 of the total amount of tax collected at the level of the group

To help you understand, we summarize in the following table the possible gains depending on the type of policy that is implemented:

Example 1 : Assume that the group has voted in majority for the no policy option.

Assume also that you have decided to buy 2 units. Your gain is therefore 47 + 32 = 79. Your choice to buy 2 units will impose on each of the four other members of your group a loss of 2 x 3 = 6 tokens.

Unit number	Value	Net gain for the considered unit NO POLICY	Net gain for the considered unit TAX POLICY
Unit 1	85	47	35
Unit 2	70	32	20
Unit 3	60	22	10
Unit 4	55	17	5
Unit 5	45	7	-5
Unit 6	40	2	-10
Unit 7	30	-8	-20
Unit 8	15	-23	-35

Now, assume that the four other members of your group have bought a total of 11 units. It will cost you 11 x 3 = 33 tokens.

Your final payoff is therefore : 79 – 33 = 46 tokens.

Example 2 : Assume that the group has voted in majority for the tax policy option.

Assume also that you have decided to buy 2 units. Your gain is therefore 47 + 32 – 2 x 12 = 55. Your choice to buy 2 units will impose on each of the four other members of your group a loss of 2 x 3 = 6 tokens.

Now, assume that the four other members of your group have bought a total of 11 units. It will cost you 11 x 3 = 33 tokens.

The total amount of tax at the group level is (2 + 11) x 12 = 156

Your final payoff is therefore : 55 – 33 + (1/5) x 156 = 53.2 tokens.

To help you to make your decisions, some examples of final payoffs are presented in Table 1 for the No policy option and in Table 2 for the Tax policy option. Note that these tables are not exhaustive: the sum of units purchased by your four group members might lie between the numbers of the tables. For example, your four group members could buy a total of 19 units, which is not in the tables. The only purpose of these tables is to help you understand how payoffs work.

Remember that :

- You will be rematched in a new group of 5 buyers
- Then, you will vote before the start of these 7 new periods,
- The selected policy (majority rule) will be implemented during the 7 periods.

Figure 7: Table 1: Payoff table for "No policy"

		YOUR FOUR GROUP MEMBERS (total)							
	Purchased units	**4**	**8**	**12**	**16**	**20**	**24**	**28**	**32**
YOU	**1**	35	23	11	-1	-13	-25	-37	-49
	2	67	55	43	31	19	7	-5	-17
	3	89	77	65	53	41	29	17	5
	4	106	94	82	70	58	46	34	22
	5	113	101	89	77	65	53	41	29
	6	115	103	91	79	67	55	43	31
	7	107	95	83	71	59	47	35	23
	8	84	72	60	48	36	24	12	0

Figure 8: Table 2: Payoff table for "Tax policy"

		YOUR FOUR GROUP MEMBERS (total)							
	Purchased units	**4**	**8**	**12**	**16**	**20**	**24**	**28**	**32**
YOU	**1**	35	33	30	28	25	23	21	18
	2	57	55	53	50	48	45	43	41
	3	70	67	65	63	60	58	55	53
	4	77	75	72	70	68	65	63	60
	5	75	72	70	67	65	63	60	58
	6	67	65	62	60	57	55	53	50
	7	49	47	45	42	40	37	35	33
	8	17	14	12	10	7	5	2	0

Before the start of the market game, you will be informed about the result of the vote

Third stage

In this stage you are going to play 7 additional periods, and:

1. You are going to be rematched in a new group of 5 subjects. The groups being randomly composed, it may be the case that you have already played with some of the other group members. In any case, you will never know the exact identity of the other members of the group and you will not know if you have already played with them.

2. Before playing this market game, you will have to vote between the No policy option or the Tax policy option. The option that will receive the majority of votes, that is, at least 3 votes, will be implemented for the 7 periods of this second stage.

To help you in your decisions, below you will find a table summarizing your possible payoff depending on the number of units you buy and on the total number of units bought by the other members of your group if the “No policy” is adopted:

Figure 9: Table 1: Payoff table for "No policy"

		YOUR FOUR GROUP MEMBERS (total)							
	Purchased units	**4**	**8**	**12**	**16**	**20**	**24**	**28**	**32**
YOU	**1**	35	23	11	-1	-13	-25	-37	-49
	2	67	55	43	31	19	7	-5	-17
	3	89	77	65	53	41	29	17	5
	4	106	94	82	70	58	46	34	22
	5	113	101	89	77	65	53	41	29
	6	115	103	91	79	67	55	43	31
	7	107	95	83	71	59	47	35	23
	8	84	72	60	48	36	24	12	0

Figure 10: Table 2: Payoff table for "Tax policy"

		YOUR FOUR GROUP MEMBERS (total)							
	Purchased units	**4**	**8**	**12**	**16**	**20**	**24**	**28**	**32**
YOU	**1**	35	33	30	28	25	23	21	18
	2	57	55	53	50	48	45	43	41
	3	70	67	65	63	60	58	55	53
	4	77	75	72	70	68	65	63	60
	5	75	72	70	67	65	63	60	58
	6	67	65	62	60	57	55	53	50
	7	49	47	45	42	40	37	35	33
	8	17	14	12	10	7	5	2	0

At the end of this third stage :

1. You will answer some socio-economic questions
2. A stage, and then a period, will be randomly selected for your payment.
3. We will call you individually to pay you.

B Determinants of subjects' beliefs

We report in this Appendix econometric analyses to assess the determinants of subjects' personal, normative, and positive beliefs regarding the Pigouvian tax. We focus on treatments in which beliefs are elicited, i.e., treatments *B-NSI* and *B-SI* only.

Our main explanatory variables are: *Average others' purchases*$_{t-1}$, a continuous variable that corresponds to the average purchased units by the other subject group members at the round before beliefs elicitation; *Norm importance*, a dummy equal to one for subjects indicating in the questionnaire at the end of the experiment that conforming to their peers' behavior matters to them; *Used to vote*, a dummy equal to one for subjects who indicated that they often or always go to vote when there are referendum; and *Post COVID*, a dummy equal to one for subjects who participated to the experiment in 2022 after the COVID period. We also control for subjects' *Age*, gender with the dummy variable *Female*, and university background with the variable *Background* that is equal to one if subjects follow economic studies.

The results are reported in Table VIII for personal beliefs (Probit models) and Table IX for normative and positive beliefs (Tobit models). For each type of belief, we estimate the model twice: with and without the control variables.

Whatever the type of belief, the most robust effect we find is that providing subjects with social information significantly influences: (i) the probability to consider that voting for the tax is the right thing to do (personal beliefs); (ii) the perceived number of other subjects in the session who consider that voting for the tax is the right thing to do (normative beliefs); and (iii) the perceived number of other subjects in the session who will vote for the implementation of the tax (positive beliefs). The same observations hold, for each type of belief, for subjects who are used to voting (but at the 10% level only for normative beliefs).

Table VIII: Probit estimations to explain subjects' personal beliefs

	(1)	(2)
B-NSI	*Ref.*	*Ref.*
B-SI	0.313**	0.433***
	(0.148)	(0.126)
Average others' purchases$_{t-1}$		0.0231
		(0.045)
Norm importance		0.138
		(0.151)
Used to vote		0.248**
		(0.124)
Post COVID		-0.430***
		(0.153)
Age		-0.0265**
		(0.011)
Female		-0.153
		(0.159)
Background		-0.281
		(0.198)
Constant	0.798***	1.149
	(0.078)	(1.030)
Observations	480	480
Number of clusters	48	48
Log-likelihood	-218.4	-209.0
Wald χ^2	4.486	35.94
Prob. $> \chi^2$	0.0342	0.0000

We estimate Probit models to assess the determinants of personal beliefs. Model (1) is estimated without control variables, while model (2) is estimated with control variables. Clustered standard errors (at the sub-session level) in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table IX: Tobit estimations to explain subjects' normative and positive beliefs

	Normative beliefs		Positive beliefs	
	(1)	(2)	(3)	(4)
B-NSI	*Ref.*	*Ref.*	*Ref.*	*Ref.*
B-SI	3.576***	3.387***	3.179***	2.933***
	(0.391)	(0.378)	(0.473)	(0.431)
Average others' purchases$_{t-1}$		0.065		0.335*
		(0.151)		(0.185)
Norm importance		-0.554		0.104
		(0.553)		(0.616)
Used to vote		0.929*		1.041**
		(0.490)		(0.498)
Post COVID		0.595		0.077
		(0.400)		(0.429)
Age		-0.006		-0.012
		(0.045)		(0.045)
Female		0.101		-1.268***
		(0.512)		(0.465)
Background		-1.448**		-1.042*
		(0.706)		(0.558)
Constant	12.919***	11.049***	11.748***	5.213
	(0.249)	(3.290)	(0.332)	(4.050)
Observations	480	480	480	480
Number of clusters	48	48	48	48
Left-censored	4	4	2	2
Right-censored	41	41	30	30
Log-likelihood	-1362.7036	-1357.1876	-1382.1661	-1372.157
Pseudo R^2	0.0208	0.0248	0.0172	0.0243

We estimate Tobit models to assess the determinants of normative and positive beliefs. In models (1) and (2) we focus on normative beliefs, while we focus on positive beliefs in models (3) and (4). Models (1) and (3) are estimated without control variables, while models (2) and (4) are estimated with control variables. Clustered standard errors (at the sub-session level) in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

C Effect of beliefs elicitation on subjects' votes and purchased quantities

We report in this Appendix additional analyses to assess whether, or not, the fact to elicit beliefs has some influence on subjects' votes (Table X) and the purchased units (Table XI). Indeed, as discussed in the main text, one could consider that the fact to elicit subjects' beliefs may act a form of priming, i.e., as a signal to subjects that there may be an interest in voting for tax implementation and/or reducing the number of purchased units. Therefore, these additional analyses aimed to clarify the existence of such an effect.

Table X replicates the analyses presented in Table V focusing on treatments *NB-NSI* and *B-NSI* to assess the effect of eliciting beliefs on subjects' votes in the absence of social information provision (models (1) and (3)), and on treatments *NB-SI* and *B-SI* to assess the effect of beliefs elicitation on subjects' votes when social information is provided (models (2) and (4)). Our main result of interest here is that whatever the vote (first or second), beliefs elicitation never influences subjects' voting behavior. These additional analyses therefore confirm that only social information provision does influence subjects' voting behavior. However, it should be noted that model (1) does not satisfy the Wald test.

Table XI replicates the analyses presented in Table VII, again focusing on treatments *NB-NSI* and *B-NSI* to assess the effect of eliciting beliefs on subjects' purchased units in the absence of social information provision (models (1) and (3)), and on treatments *NB-SI* and *B-SI* to assess the effect of beliefs elicitation on subjects' purchased units when social information is provided (models (2) and (4)). Similarly to the results discussed in the main text, we again do not find any significant effect of the treatments on subjects' purchased units.

Table X: Probit estimates of voting models

	First vote		Second vote	
	(1)	(2)	(3)	(4)
NB-NSI	*Ref.*		*Ref.*	
B-NSI	0.0151		0.216	
	(0.101)		(0.145)	
NB-SI		*Ref.*		*Ref.*
B-SI		-0.0147		0.215
		(0.131)		(0.144)
Supported tax (vote 1)			1.470***	1.746***
			(0.173)	(0.166)
Group is taxed in per. 8 to 14			0.417***	0.382
			(0.160)	(0.328)
Norm importance	-0.0519	-0.0266	-0.0959	0.237
	(0.131)	(0.141)	(0.166)	(0.199)
Used to vote	0.108	0.299**	0.314**	0.321*
	(0.128)	(0.142)	(0.145)	(0.173)
Post COVID	-0.140	-0.409***	-0.0109	0.101
	(0.109)	(0.148)	(0.142)	(0.160)
Constant	1.021***	1.222***	-0.995**	-0.521
	(0.334)	(0.368)	(0.457)	(0.402)
Observations	480	480	480	480
Number of clusters	48	48	48	48
Log-likelihood	-286.8	-250.5	-199.4	-152.3
Wald χ^2	6.324	16.22	107.4	149.1
Prob. $> \chi^2$	0.5025	0.0232	0.0000	0.0000

We estimate Probit models to assess the determinants of voting behavior when beliefs are elicited. We focus on the first vote in models (1) and (2), while we focus on the second one in models (3) and (4). In models (1) and (3), we compare subjects in treatments *NB-NSI* and *B-NSI*, while we compare subjects in treatments *NB-SI* and *B-SI* in models (2) and (4). All estimations include variables for the subject's age, gender and background. Clustered standard errors (at the sub-session level) in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table XI: Tobit estimates of individual decisions about purchased units

	(1)	(2)
NB-NSI	*Ref.*	
B-NSI	0.040	
	(0.035)	
NB-SI		*Ref.*
B-SI		0.041
		(0.034)
Period	-0.002	-0.006**
	(0.002)	(0.003)
Always protested	0.160*	0.024
	(0.091)	(0.047)
Group is taxed	-1.391***	-1.660***
	(0.050)	(0.122)
Tax supporter×Group is taxed	0.087	-0.013
	(0.055)	(0.078)
Always protested×Group is taxed	0.020	-0.052
	(0.103)	(0.096)
Norm importance	0.006	-0.027
	(0.048)	(0.044)
Used to vote	0.013	0.023
	(0.042)	(0.039)
Post COVID	-0.020	-0.016
	(0.039)	(0.034)
Constant	5.256***	5.823***
	(0.208)	(0.173)
Observations	6720	6720
Number of clusters	48	48
Log-likelihood	-7716.998	-7516.080
Pseudo R^2	0.1323	0.1140

We estimate Tobit models to assess the determinants of purchasing behavior when beliefs are elicited. In model (1) we compare subjects in treatments *NB-NSI* and *B-NSI*, while in model (2) we compare subjects in treatments *NB-SI* and *B-SI*. All estimations include variables for the subject's age, gender and background. Clustered standard errors (at the sub-session level) in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

D Robustness checks

We replicate in this Appendix our main econometric analyses considering subjects who participated in our experiment in 2022 only, i.e., after the COVID pandemic.

We start with the analyses on subjects' voting behavior. Table XII replicates Table V in the main text. Our main conclusion is that most results are replicated, except that we no longer detect any effect of social information provision on subjects' votes when beliefs are elicited (model (2)). However, it should be noted that model (2) does not satisfy the Wald test.

Table XIII replicates Table X. Our main conclusion is that, again, our results are replicated: we do not detect any significant effect of beliefs elicitation on subjects' voting behavior, as expected. It should be noted that model (1) does not satisfy the Wald test.

Table XIV replicates the mediation analysis proposed in Table VI. We again find a significant indirect effect, but, in line with the results reported in Table XII, we no longer detect any significant total effect.

We next turn to the analyses of subjects' purchasing behavior. Table XV replicates Table VII in the main text. Overall, our main results discussed in the main text still hold. We also observe that, in model (2) that compares subjects in treatment *B-NSI* and *B-SI*, those who never voted for tax implementation (votes 1 and 2) significantly purchase more units (at the 5% level). This observation is not surprising: the more units a subject wants to buy, the higher the tax that should be paid. Then, such subjects have no interest in voting for tax implementation if they want to buy a high number of units.

Finally, Table XVI replicates Table XI. Again, we confirm our previous results. We also observe that, in model (1) that compares subjects in treatment *NB-NSI* and *B-NSI*, those who never voted for tax implementation (votes 1 and 2) significantly purchase more units (at the 5% level). This result was significant at the 10% level only in Table XI.

Table XII: Probit estimates of voting models

	First vote		Second vote	
	(1)	(2)	(3)	(4)
NB-NSI	*Ref.*		*Ref.*	
NB-SI	0.279*		0.274	
	(0.147)		(0.174)	
B-NSI		*Ref.*		*Ref.*
B-SI		0.113		0.169
		(0.139)		(0.207)
Supported tax (vote 1)			1.331***	1.778***
			(0.161)	(0.249)
Group is taxed in per. 8 to 14			0.522*	0.100
			(0.281)	(0.226)
Norm importance	-0.137	0.150	-0.176	0.545*
	(0.156)	(0.180)	(0.233)	(0.284)
Used to vote	0.0615	0.0687	0.219	0.155
	(0.214)	(0.146)	(0.202)	(0.174)
Constant	1.247***	1.037***	-0.196	-1.072*
	(0.380)	(0.402)	(0.444)	(0.576)
Observations	300	300	300	300
Number of clusters	30	30	30	30
Log-likelihood	-172.4	-177.4	-121.4	-105.2
Wald χ^2	13.03	9.610	121.3	95.39
Prob. $> \chi^2$	0.0425	0.1420	0.0000	0.0000

We estimate Probit models to assess the determinants of voting behavior when social information is provided. We focus on the first vote in models (1) and (2), while we focus on the second one in models (3) and (4). In models (1) and (3), we compare subjects in treatments *NB-NSI* and *NB-SI*, while we compare subjects in treatments *B-NSI* and *B-SI* in models (2) and (4). All estimations include variables for the subject's age, gender and background. Clustered standard errors (at the sub-session level) in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table XIII: Probit estimates of voting models

	First vote		Second vote	
	(1)	(2)	(3)	(4)
NB-NSI	*Ref.*		*Ref.*	
B-NSI	0.0650		0.213	
	(0.132)		(0.194)	
NB-SI		*Ref.*		*Ref.*
B-SI		-0.0920		0.0747
		(0.149)		(0.167)
Supported tax (vote 1)			1.274***	1.752***
			(0.206)	(0.189)
Group is taxed in per. 8 to 14			0.555**	0.131
			(0.219)	(0.298)
Norm importance	-0.0165	0.0443	-0.137	0.377
	(0.186)	(0.162)	(0.225)	(0.266)
Used to vote	-0.0641	0.189	0.227	0.204
	(0.159)	(0.181)	(0.202)	(0.214)
Constant	1.259***	1.261***	-0.776	-0.134
	(0.365)	(0.380)	(0.541)	(0.527)
Observations	260	340	260	340
Number of clusters	26	34	26	34
Log-likelihood	-160.1	-190.0	-117.1	-109.7
Wald χ^2	7.769	10.66	66.12	117.5
Prob. $> \chi^2$	0.2555	0.0994	0.0000	0.0000

We estimate Probit models to assess the determinants of voting behavior when beliefs are elicited. We focus on the first vote in models (1) and (2), while we focus on the second one in models (3) and (4). In models (1) and (3), we compare subjects in treatments *NB-NSI* and *B-NSI*, while we compare subjects in treatments *NB-SI* and *B-SI* in models (2) and (4). All estimations include variables for the subject's age, gender and background. Clustered standard errors (at the sub-session level) in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table XIV: Direct, indirect and total effects of social information provision on subjects' first vote (2022's subjects only)

	Coefficient	Standard Error	95% confidence interval
Indirect effect ($\delta(T_i)$)	0.0724***	0.0240	[0.0253;0.1195]
Direct effect ($\kappa(T_i)$)	-0.0336	0.0503	[-0.1322;0.0650]
Total effect (τ)	0.0389	0.0459	[-0.0510;0.1288]
Observations	300		
Number of clusters	30		

This table reports the results of the estimation of the system of Eq. (3) and (4) with subjects from treatments B-NSI and B-SI, relying on a linear approach. In Eq. (3) we also control for the following variables: *Norm importance*, *Used to vote*, *Age*, *Gender* and *Background*. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table XV: Tobit estimates of individual decisions about purchased units (2022's subjects only)

	(1)	(2)
NB-NSI	*Ref.*	
NB-SI	-0.023	
	(0.040)	
B-NSI		*Ref.*
B-SI		0.001
		(0.053)
Period	-0.004	-0.011***
	(0.004)	(0.003)
Always protested	0.159	0.165**
	(0.171)	(0.083)
Group is taxed	-1.440***	-1.550***
	(0.091)	(0.096)
Tax supporter×Group is taxed	0.044	0.043
	(0.097)	(0.079)
Always protested×Group is taxed	-0.109	-0.084
	(0.139)	(0.102)
Norm importance	-0.026	-0.015
	(0.054)	(0.066)
Used to vote	-0.055	0.075
	(0.051)	(0.054)
Constant	5.642***	5.521***
	(0.166)	(0.256)
Observations	4200	4200
Number of clusters	30	30
Log-likelihood	-4796.623	-5041.444
Pseudo R^2	0.1225	0.1429

We estimate Tobit models to assess the determinants of purchasing behavior when social information is provided. In model (1) we compare subjects in treatments *NB-NSI* and *NB-SI*, while in model (2) we compare subjects in treatments *B-NSI* and *B-SI*. All estimations include variables for the subject's age, gender and background. Clustered standard errors (at the sub-session level) in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table XVI: Tobit estimates of individual decisions about purchased units (2022's subjects only)

	(1)	(2)
NB-NSI	*Ref.*	
B-NSI	0.046	
	(0.045)	
NB-SI		*Ref.*
B-SI		0.052
		(0.045)
Period	-0.005*	-0.008***
	(0.003)	(0.003)
Always protested	0.272**	0.022
	(0.123)	(0.052)
Group is taxed	-1.404***	-1.702***
	(0.062)	(0.127)
Tax supporter×Group is taxed	0.149*	-0.035
	(0.079)	(0.088)
Always protested×Group is taxed	-0.099	-0.048
	(0.119)	(0.104)
Norm importance	-0.001	-0.041
	(0.071)	(0.056)
Used to vote	0.084	-0.018
	(0.059)	(0.050)
Constant	5.171***	5.960***
	(0.295)	(0.165)
Observations	3640	4760
Number of clusters	26	34
Log-likelihood	-4285.058	-5541.568
Pseudo R^2	0.1474	0.1235

We estimate Tobit models to assess the determinants of purchasing behavior when beliefs are elicited. In model (1) we compare subjects in treatments *NB-NSI* and *B-NSI*, while in model (2) we compare subjects in treatments *NB-SI* and *B-SI*. All estimations include variables for the subject's age, gender and background. Clustered standard errors (at the sub-session level) in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.