Are People Willing to Pay to Prevent Natural Disasters?

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Abstract

We implement a survey experiment to study whether awareness of the consequences of hydrogeological risk affects people's willingness to fight it. To do so, we leverage a representative panel of 5,000 Italian individuals interviewed at quarterly frequency, starting in October 2023. We elicit survey participants' willingness to contribute to a public fund to finance investment to secure areas exposed to hydrogeological risk under different information treatments. We find that disclosing information about the consequences of hydrogeological risk causes individuals to increase both support for public funding and individual willingness to pay for the policy. Compared to the control group, individuals exposed to the treatment were 9 percentage points more likely to contribute to the fund and more willing to contribute an additional €29. Applying the information treatment to the whole working age population could raise as much as €0.26 billion per year. We provide evidence that individual willingness to pay depends on individual knowledge that the success of the policy depends critically on the willingness to pay of other citizens.

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1. Introduction

Tackling the consequences of environmental change and associated extreme events requires massive mobilization of public resources (Trancoso et al., 2024). For instance, the European Union (EU) (2023) estimates that financing the green transition could reach €578bn per year up to 2030. This will require an extraordinary public financing effort. Lack of awareness among voters about the scale of the risks involved is likely to result in limited public support for the financing of the policies that will be required. Without public support, it will be difficult for governments to implement the necessary funding measures. Disseminating information to raise awareness of environmental risks could be a powerful strategy for garnering this support. We need to know whether this strategy would succeed in practice: since protecting the environment is a public good, dissemination of information may not be enough to counteract incentives to free ride even when people are aware of the environmental risks.

In this paper we provide evidence about people's willingness to support and *voluntarily* to pay for the establishment a dedicated public fund to finance investment in prevention and mitigation of environmental disruptions and secure areas exposed to hydrogeological risk. Most important, we provide evidence showing whether information dissemination about the damage caused by environmental disruption *causally* increases the willingness to contribute to the fund and increases the amount contributed. We refine the analysis by studying how individual willingness to pay (WTP) in response to information treatments depends on the level of the respondent's knowledge about the criticality for policy success of the WTP among the overall population.

We conduct a Randomized Control Trial (RCT) based on a representative panel of around 5,000 Italian individuals aged between 18 and 75 years who were interviewed at quarterly frequency, starting in October 2023. We elicit the survey participants' willingness to contribute to the public fund under different information treatments in line with a growing stream of work on similar treatments in relation to large scale surveys, see Bachmann et al. (2022), Stantcheva (2023), Coibion et al (2022, 2024). Since it is conceivable that opposition to government funded green programs would be less were people willing to contribute voluntarily to the program, our experiment provides a better understanding about whether dissemination of information is an effective way to increase consensus related to compulsory fiscal contributions.

We designed the experiment with two layers of randomization. In the first layer three groups of survey participants are randomly selected. The control group is not given any information and reports only WTP for the fund, in terms of participation in the fund, and amount the individual would be willing to contribute. A first treatment group receives information on the number of deaths and displaced people following a hydrogeological catastrophe that occurred on May 16-17, 2023 in Romagna, a northern Italian region. A second treatment group receives the same information in addition to information on the amount in euros, of the economic damage caused by the disaster. If information diffusion is an effective way to raise awareness about the value of public investment for tackling environmental risk, we would expect the treated individuals to be more willing to participate in the fund and more willing to contribute more to it.

In the second randomly selected layer all the individuals in the sample are allocated randomly to two groups. The questionnaire administered to the second layer control group asks the respondents to read a statement explaining that the investment needed to contain environmental disruption risks requires a substantial amount of public resources. The second layer treated group receives the same information complemented by a statement that tells them that should there not be a sufficient number of individuals willing to contribute, or should the amount contributed be too small, the policy will fail. Therefore, the experiment treats the second group with information on the cost of hydrogeological risks (the first layer) and the relevance of wide participation for policy success (the second layer).

The second layer is noteworthy because awareness that policy success depends on the choice of the other citizens also, could have an ambiguous effect on the WTP. On the one hand, it could enhance individual perception of the importance and value of his/her contribution for the success of the policy, and thus could increase the cost of non-participating and strengthen the motivation to contribute more. On the other hand, the treatment might focus the individual's attention on the decisions made by the other citizens. Skepticism about the pro-social attitude of fellow citizens can induce pessimism about policy success and reduce the individual's willingness to contribute to the fund. Understanding which effect dominates would be informative for policy design.

The design of the treatments was inspired by the large literature on public good games. A robust finding in this literature is that even in one shot games an even in the absence of an external monitor people tend to contribute to the public good rejecting the no contribution

predicted by selfish individuals in the Nash equilibrium.[1] In general, in lab experiments involving public good games, peoples' cooperative behavior responds positively to the payoffs, measured by the marginal net benefit from the public good (e.g. Capraro, 2013). The first treatment is aimed at testing this sensitivity. Also, people respond to the behavior of others, and particularly the presence of free riders (e.g. Dong et al., 2016). The second treatment explores this sensitivity in our large sample of the adult population in a real hydrogeological risk context.

The survey indicates substantial support for the public fund, even among individuals not exposed to the treatment: 52.1% expressed willingness to contribute, with a median amount of €25. However, a notable portion (18.4%), is unwilling to pay, and an even larger percentage (29.5%) is undecided, indicating potential for policies aimed at raising awareness. Disclosing information about the consequences of hydrogeological risk causes individuals to increase their support for the public fund and their WTP for the policy. Compared to the control group, individuals exposed *only* to the first-stage treatment are around 9 percentage points more likely to support the establishment of a fund and would be willing to contribute an additional €29 to it. Notably, about half of the observed effect on the willingness to participate stems from the group of previously undecided individuals.

Treating individuals with information that the policy might fail if not enough people endorse it, reduces the willingness to contribute to the fund by 6 percentage points. About half of this reduction comes from an increase in the number of undecided and half comes from the group opposed to a fund. The effect of the second treatment on the amount contributed is not statistically different from zero. We observe that the information treatments are economically important. A simple back-of-the-envelope calculation implies that applying the first stage treatment to the whole working age population could raise as much as €0.26 billion per year, 33% more than in the case of no awareness campaign prior to the establishment of the fund.

Our paper contributes to work on the WTP for environmental risk and in particular to contingent valuation methods that involve individuals reporting their WTP for a hypothetical environmental improvement or a reduction in environmental risk (see Mitchell and Carson 1989, the classic manual by Bateman et al. 2002, and OECD 2018).[2] There is a large stream of

[1] The literature is too large to cite all the contributions but see among others Isaac and Walker (1988), Cooper et al. (1996), Fehr and Gachter (2000), Fischbacher et al. (2001), , Horton et al. (2011), Dreber et al. (2013). Chaudhuri (2011) offers a broad review of the literature.

[2] The contingent valuation method is a stated preferences approach in which respondents are asked directly for their WTP for a hypothetical change in the level of provision of a non-market good.

work on the demand for insurance against high impact low probability events such as natural disasters (see McClelland et al. 1993 and Kriesel and Landry 2004). Also, Botzen and van den Bergh (2012) elicit individual risk beliefs and demand for flood insurance using the contingent valuation survey method on a sample of homeowners in a Dutch river delta.

Stated preferences techniques allow estimation of the monetary value placed by the individual on environmental outcomes; however, this technique has been criticized on the grounds that due to respondents' reluctance to reveal their true preferences or due to a lack of understanding of the hypothetical scenario, stated preferences might differ from actual behavior. In this respect, our randomization is important: to the extent that preferences and other unobserved characteristics are randomly distributed across treatments and control groups, it is still possible to estimate the causal impact of information on the WTP.[3]

As already mentioned, this paper is part of a broader research program that uses RCT methods in largescale surveys of households or firms to study economic issues. For example, Roth and Wohlfart (2020) use information treatments related to the economic outlook to study how households' expectations about future growth affect their consumption plans. Also, Armantier et al. (2016b) and Cavallo et al. (2017) study how distinct types of information on inflation or monetary policy affect households' inflation expectations. Coibion et al. (2024) adopt a similar strategy to show that exogenous variation in household inflation expectations affects subsequent household spending decisions. Coibion et al. (2018) use RCT methods to study how firms' expectations affect their subsequent pricing, investment, and employment decisions, and how monetary policy affects inflation expectations.

The rest of the paper is organized as follows. Section 2 describes the survey and provides details of the RCT design and the structure of the information treatments. Section 3 presents the main results of the experiments and provides some initial evidence of the casual effects of the treatments on the probability that people support the policy and the amounts they are willing to pay. Section 4 tests whether the treatment effects are heterogenous in the population, and discusses the sensitivity of the results to controlling for prior beliefs, socioeconomic variables, political orientation, and "objective" environmental risk. Section 5 concludes. Additional evidence and detailed information on the survey are provided in the appendix.

[3] Other methods to infer individual WTP rely on revealed preferences methods and actual behavior in markets related to environmental goods or services. Revealed preferences methods may not capture non-market values or preferences for goods not traded in markets, such as environmental risk.

2. Data and experimental design

We ran our experiment using Italian Survey of Consumers Expectations (ISCE), a new consumption and expectations survey which starting in October 2023 aims to interviewed a representative panel of Italian individuals. ISCE is a quarterly rotating panel with two completed waves, the first in October 2023 (wave 1) and the second in January 2024 (wave 2). ISCE collects data on demographic variables, household resources (income and wealth components), consumption, and expectations about individual variables such as consumption and income, and aggregate macroeconomic variables such as inflation, unemployment rate, nominal interest rate, and economic growth.

2.1. The survey

The survey builds on two international experiences of online, high-frequency surveys. The New York Fed Survey of Consumer Expectations collects monthly information on consumers' views and expectations regarding inflation, employment, income, and household finances (Armantier et al., 2016a). The European Central Bank Consumer Expectations Survey (ECB, 2021) collects similar data from about 20,000 households in 11 euro area economies.[4] Both of these surveys include some questions that are always included and some special modules that vary across waves.

The ISCE targets the Italian resident population aged between 18-75 years. A pilot of 100 interviews was administered in September 2023. Variables such as income, consumption, and expectations refer to October 2023 (wave 1) and January 2024 (wave 2), with respectively 5,007 and 5,002 observations. Of the 5,002 respondents in wave 2, 805 entered the panel for the first time, and 4,197 were interviewed in wave 1. In this paper we use a special module fielded in wave 2, and rely also on background information on perception of risk of a natural disaster available from wave 1.

The sampling scheme is similar to that applied in many similar surveys. The Italian resident population is stratified based on three criteria: area of residence (North-East, North-West, Central and South Italy), age group (18-34, 35-44, 45-54, 55-64, over 65), gender, education (college degree, high school degree, less than high school), and occupation (working,

[4] Several other international experiences are also useful references, such as the Social Economic Lab at Harvard whose surveys are used to explore what determines social preferences, attitudes, and perceptions.

not working). All interviews were enabled by a Computer Assisted Web Interviewing (CAWI) method. The overall response rate was around 70% in both waves, with quite low unit non-response for all questions. We use sample weights to make statistics population-representative. The ISCE Statistical Bulletin presents detailed information about the survey, see Guiso and Jappelli (2024).

Appendix table A1 compares the sample means of the ISCE selected variables and the most recent available Bank of Italy Survey of Household Income and Wealth (SHIW). The gender, age, and geographic distributions in the two samples are similar but the differences for education are significant. The proportion of respondents with college education is 22% in the ISCE compared to 13% in the SHIW, and the proportion of individuals with secondary education is 39% in the SHIW and 32% in the ISCE. Also, the ISCE sample includes a lower proportion of retired individuals (16% vs. 21% in the SHIW), and singles. Since education is correlated with income, the survey oversamples a relatively rich segment of the population which is more likely to have internet access and is more able to respond to online questionnaires.

In addition to eliciting expectations, ISCE is open to proposals from academic scholars to gather data on specific topics, experiment with new questions, and help in the design of RCTs. For instance, in wave 2 we proposed the RCT discussed in this paper, and in wave 1 we introduced a special module measuring the probability assessments of Italian residents scored on a scale of 1% to 100% regarding the occurrence of a set of 10 major risks. These risks ranged from risks arising from disruptive innovative technology to the collapse of the financial system or another pandemic. One of the risks included was natural disasters (including floods) linked to climate change. Respondents were also asked to report whether the event could have major economic consequences for Italy and for their personal income.[5]

2.2. The experimental design

Opinions about perception of the risk of a natural disaster provides useful information on people's prior beliefs before the information treatments introduced in wave 2, three months

[5] The question was: *Now you will read about a series of serious events. Think about each of these events and indicate on a scale from 1 to 100 how likely you think each event is to occur in the next 5 years in our country, where 1 indicates that you think it is "virtually impossible " and 100 that you think it is "virtually certain"*. The event was described as follows: natural disasters linked to climate change (floods, droughts, landslides, fires, etc.).

after wave 1. Specifically, in wave 2 we applied a two-stage information treatment. In the first stage, we randomly allocated survey participants to a control group labeled T1, and two information-treated groups, T2 and T3. In the second stage, all survey participants (T1, T2, and T3) were randomly allocated to a control group G1 which received no treatment and a group G2 which received a second-round information treatment.

Table 1 summarizes the structure of the information treatments applied before people reported their WTP. Groups T2 and T3 received a first stage treatment ("describe the flood consequences") which provides information on the consequences of hydrogeological risk. People in group T2 were given the following statement:

In Romagna, on the night of May 16 and 17, an unprecedented amount of rain caused the rivers to rise rapidly and flood in the space of only a few hours. Practically all the waterways between Rimini and Bologna, a total of 21, burst their banks, flooding vast areas of Romagna. Fifteen people died and some 40,000 were displaced.

The heavy rain was a dramatic and rare event that established a historical record. In the first 20 days of May 2023 rainfall amounting to 4 billion cubic meters of water fell on a territory of 1,600 square km, slightly more than 7% of the size of the whole region. The amount of rain that fell was equivalent to three times the annual consumption of water in the whole of the Romagna region.[6] The treatment was designed to recall the serious consequences of the event in a neutral way. In addition, at the time the event was quite recent occurring only 8 months before the survey was administered.

Group T3 received the same statement with the addition of a closing sentence to the text providing information *also* on the level of the economic damage in the affected area. This treatment was designed to evaluate whether the following extra piece of information increased the WTP:

The regional government calculated that the damage to roads, schools, embankments, canals and private homes and commercial buildings would reach nearly €9 billion.

In the second stage randomization described in Table 1 ("evoke free riding"), all participants were randomly assigned to two different groups to elicit WTP. Group G1 was asked

[6] See the Hearing of the President of the Regional Government to the Parliament (Bonaccini, 2023).

to respond to the following question on the WTP for a public fund dedicated to protecting against hydrogeological risks:

Containing environmental instability and securing areas exposed to hydrogeological risk (floods, landslides, etc.) requires large amounts of public resources. To finance these investments, would you support the creation of a dedicated public fund?

Possible responses to of this "extensive margin" WTP question were: "*Yes*", "*No*", and "*I don't know*". The last option is quite important in our context. It might reflect insufficient knowledge or enough information; also, T2 and T3 could increase the support for the policy at the extensive margin, by inducing some of those who answered "No", and some uncertain about supporting the public fund to change their minds. This last group is described as "*the undecided*". Then, those who responded "*Yes*" were asked an "intensive margin" WTP question about how much they would be willing to contribute:[7]

How much would you be willing to contribute to this fund each year in euro? 5-10; 10-20; 20-50; 50-100; 100-200; 200-300; 300-400; 400-500; 500 -1000; more than 1000.

Group G2 was given the following statement:

Containing environmental instability and securing areas exposed to hydrogeological risk (floods, landslides, etc.) requires a large investment of public resources. ***Success depends on the size of the fund. If only a few contribute, the risk containment policy will fail.*** *To finance these investments, would you be in favor of creating a dedicated public fund?*

The sentence in bold is the second stage information treatment. G2 reminds respondents that the success of the public fund will be threatened if not sufficient numbers of people contribute – either because some free ride or because they are ignoring the benefits of mitigating environmental risk and thus do not express support for the policy. This treatment is aimed at investigating to what extent the design of policies and information campaigns related to the risks arising from climate change should consider that WTP depends on fear of others free riding rather than lack of awareness of the environmental risks. Similar to group G1, this group then is asked the intensive WTP question: "*How much would you be willing to contribute to this fund each year?*"

[7] In our payment card approach respondents were asked to choose a contribution based on an interval amount. We assume that the mid-point of the interval (if this value is positive) represents the respondent's true WTP .

Table 1 summarizes the structure of the information treatment. There is a total of six groups: the no-information treatments (T1G1) is the control group, T1G2 receives only the second stage free riding treatment, T2G1 and T3G1 receive only the first stage treatment, and T2G2 and T3G2 receive both treatments. In what follows, we label T2 and T3 as respectively, "*weak cost*" and "*strong cost*" information treatments. We label the G2 treatment as "*many for success*."

2.3. Descriptive statistics and balance tests

Table 2 presents summary statistics for the selected characteristics for the whole sample and the five randomized groups. Each of the three *T* groups includes around a third of the total sample, and each of the two G groups includes about half of the sample. A quick glance at the summary statistics reveals small differences in the characteristics of the three first-stage groups and the two second-stage groups. Age, gender, marital status, and all the demographic variables and disposable income and homeownership have very similar means across the six groups.

Table 3 presents the results for the formal balance tests for each random group using probit regressions for the probability of being included in the subsample. Out of the 70 estimated parameters only 8 are statistically different from zero at the 10% confidence level, 5 at the 5% level, and none at the 1% level. For all other parameters the null hypothesis that they are zero cannot be rejected. In all cases the differences are economically negligible, implying that the randomization was successfully implemented.

Since by design the treatments are orthogonal to individual characteristics, we can estimate the causal effects of exogenous information meant to enhance awareness of the cost of hydrogeological risk on WTP and capture two dimensions of the decision to adhere to the fund. The first is an *extensive margin* about the decision to contribute to the public fund, and the second is the *intensive margin*, measuring how much money respondents are willing to contribute to the fund.

3. The effect of information on WTP

We first examine the WTP for the control sample, the group of individuals non-treated in the first and the second rounds (840 observations) and compare this to the total sample. Table 4 presents three important aspects of the willingness to support the fund and the amount respondents would be willing to contribute. First, even with no information treatments, 52% of

respondents would be willing to support the fund and to contribute to it. It seems that a large share of the population is already aware of the significance of hydrogeological risk. Consistent with this interpretation, in the control group, those people in wave 1 who reported a higher probability of hydrogeological disasters within the next five years are more likely to support the fund. A one standard deviation higher subjective probability of a hydrogeological disaster predicts a 3 percentage point higher probability of supporting the fund.

Second, many individuals responded that they did not know whether they would be willing to contribute to the fund. This suggests there is scope for the information treatment policy. Bringing the undecided into the group of supporters of the fund will be particularly important, and especially because the WTP of citizens who are aware of the costs of hydrogeological risk might dissipate if they fear that others will not support it. This might be due to some people may free ride or because they lack the information about the risks that they could help to mitigate by supporting the policy. While it is difficult to address free riding the policy would reduce ignorance, and raise awareness and (possibly) support for funding the environmental preservation policy.

Finally, in table 4 we observe that amount that the people in the control group would be willing to contribute is very dispersed. Conditional on willingness to contribute, the median contribution in the control group (438 observations) is €25 per year. The mean of the distribution is much higher (€63) because the distribution of the contributions is right skewed. It is interesting that, 5% of the control group would be willing to contribute more than €150 per year. Next, we present the main results of the experiment.

3.1. Model specification

We ran probit regressions for the probability of supporting the program, and estimated ordered probit models for the probability of supporting the program, being undecided (the "I don't know" response), and opposing the program. We use all the observations; setting to missing the "I don't know" observations would result in a sample that depends on subsamples that are not randomized and are affected by endogenous selection by respondents in the yes/no/don't know options - in their turn depend on the information treatments, which would undermine identification of the causal effect of the treatments on the outcomes.

We estimated Tobit models for the amount people would be willing to contribute, setting to zero the amounts of those unwilling to contribute or undecided. We specify our model as:

$$y_i = \beta_1 T_2 + \beta_2 T_3 + \beta_3 G_2 + \beta_4 T_2 G_2 + \beta_5 T_3 G_2 + \varepsilon_i \quad (1)$$

The left-hand side variable is the outcome of interest. Depending on the model, we estimate: the indicator for support for the fund, the indicator for undecided, and the amount willing to contribute. The right-hand side includes the treatment dummies. The excluded group is the sample of the untreated (or control group) in both stages (T1G1). The β_j parameters [j=1,...5] measure the effects of the treatments. All these effects are relative to the control group whose summary statistics are presented in table 4.

The parameters β_1 and β_2 measure the causal effects of the first stage information treatments (T2 and T3) in the absence of the second stage treatment. Comparison of the two coefficients allows us to test whether making the costs of hydrogeological risks more salient by adding the economic costs to the human lives losses affects the WTP. The coefficient β_3 measures the effect of letting participants know that success of the fund depends on the others' decisions to contribute, regardless of the information received in the first stage.

The coefficients β_4 and β_5 measure the additional effects of informing people exposed to the "weak" or "strong" "*cost*" treatments that the success of the fund depends on how many people contribute. Thus, $\beta_1 + \beta_4$ measures the total effect on the outcome of treatments T1 and G2, and $\beta_2 + \beta_5$ measures the total effect of treatments T2 and G2. Finally, a test of $\beta_4 = \beta_5 = 0$ reveals whether adding the second treatment affects the WTP of the groups treated in the first stage.

For robustness, in section 4 we report regressions controlling for observable variables to ensure that the treatments are not capturing correlation patterns in the data that might not be fully controlled by our randomization. These regressions are also of interest in terms of examining how WTP covaries with demographic variables. The random design of the survey means that these controls should be orthogonal to the treatments and therefore we expect no systematic effects on the estimated treatment parameters.

3.2. Probability of contributing and being undecided

Table 5 column 1 presents the model (1) estimates in which the outcome variable is a dummy for willingness to support the creation of the fund by contributing to it. We set responses to the WTP question of "*No*" or "*I do not know*" to zero. The values reported in the table are

marginal values and thus measure the causal effect of the treatments in percentage points. The first stage information treatment on its own significantly, statistically, and economically increases the probability that people are willing to support the fund financially. This is true regardless of whether the "weaker" T2 treatment or the "stronger" T3 was received.

The marginal effect is 9.3% for T2 and 7.2% for T3 but a chi-square test cannot reject the null hypothesis $\beta_1 = \beta_2$ (p-value 0.388). Thus, once new supporters of the fund are informed about the loss of human life caused by the hydrogeological risk they support the fund even if no economic losses are involved. If people treated in the first round are also treated in the second round which provides them with the information that fund success depends on many contributing to it, the effect are small and not statistically different from zero. They are also not statistically different from each other (p-value from testing the hypothesis that $\beta_4 = \beta_5 = 0$ is 0.629). In other words, the effect on support for the fund from the first stage information treatment does not change with the extra information that free riding/ignorance could threaten the success of the fund.

The coefficient of G2 is –0.06 and precisely estimated. This is an interesting effect. Recall that G2 has an ambiguous effects on the outcome of the experiment: on the one hand, it could increase the WTP by making the individual feel that his or her contribution might be more valuable. On the other, it might lead the respondents to conclude that since many will not contribute, then whatever they might do as individuals the fund will fail, which will reduce the WTP. This finding suggests that the second effect prevails, regardless of whether the group received the first treatment or not (since we estimates $\beta_4 = \beta_5 = 0$) . Hence, while alerting people to the serious consequences of climate risk enhances their WTP telling them that to be successful their effort requires the contributions of many fellow citizens reduces the incentive to contribute.

Overall, our baseline specification provides four major key findings: (i) the first-stage information treatment increases the WTP; (ii) the second-stage treatment has the opposite effect; (iii) it is not possible statistically to distinguish between T2 and T3 ($\beta_1 = \beta_2$) since the information about the loss of human lives in the disaster make the economic costs redundant; (iv) there are no interaction effects between the first and second treatments ($\beta_4 = \beta_5 = 0$) implying that the "*cost treatments*" are so powerful that they completely counteract the "*many-to-success*" treatment which latter has a negative effect only on the WTP of those untreated in the first stage.

In terms of the magnitude of the effects, informing people of the cost implications of hydrogeological risks increases the proportion of those willing to contribute by 8-9 percentage points but informing them also that many others must contribute for the fund to be successful reduces the proportion by 6 points. However, receiving only the "*many for success*" treatment is sufficiently strong to reduce support for the policy among the untreated from 52.1% (see Table 4) to 46%, moving the majority from individuals who would support the fund even in the absence of an information campaign to individuals who either are opposed to the fund or do not know whether or not they would support it.

Table 5 column 2 presents the estimates of the causal effect of the treatments on the WTP imposing the restrictions ($\beta_4 = \beta_5 = 0$). The marginal effects are essentially the same as in the baseline specification but are estimated with smaller standard errors: the T2 and T3 treatments increase the probability of contributing by 8 percentage points, while the G2 treatment reduces the probability by 6 points.

Because the effects of the treatments on the three alternatives must sum to zero, an increase in support for a fund caused by the treatment must derive from fewer undecided about or fewer opposed to the fund, or both. We estimated an ordered probit model to obtain a fuller picture of how the different treatments redistribute respondents across the three groups. The ordered variable takes the values 0 if the individual is opposed to the fund (responding "No" to the first WTP question), 0.5 if the respondent is undecided ("I don't know"), and 1 if the respondent supports it ("Yes").

Table 6 presents the marginal effects of the ordered probit model (a multinomial logit model delivers the same results). Column 1 includes the treatments and all the interactions. The null hypothesis that the first stage and second stage treatments (T2G2 and T3G2) are jointly equal to zero is not rejected, both economically (marginal effects close to zero) and statistically (p-value for the joint test that they are zero is 0.381). Column 2 reports the marginal effects imposing these restrictions.

The weak-cost treatment (T2) raises support for the fund by 8.9 percentage points of which 5.5 percentage points (61%) are due to a reduction in those opposed to the fund and 3.5 percentage points (39%) are due to a reduction in the size of the undecided group. The "*strong cost"* treatment (T3) has a comparable effect on support for the fund, and the contribution from a contraction in those opposed to the fund and those undecided about support is quite similar to the effect of T2. Only the second stage treatment lowers support for the fund - by 4.3 percentage

points which comes from increases of 2.6 percentage points (60%) in those opposed to the fund and 1.7 percentage points (40%) in the share of undecided.

3.3. Contribution amounts

The first regression in table 7 reports the marginal effects of the Tobit model estimates for the outcome variable of the euro amount that respondents would be willing to contribute to the fund. The variable is zero for those opposed to the policy and those undecided about contributing. The reported effects measure the additional euros contributed to the fund caused by the treatment. The effects of the two cost treatments are both positive and precisely estimated, and the null hypothesis that they are equal is not rejected (the *p*-value is 0.497).

Economically, the T2 and T3 treatments add about €25 to the individual WTP. This is a sizeable effect: it represents 34% of the sample mean of the distribution of contributions conditional on supporting the fund in the whole sample (€73), 40% of the mean of the conditional contribution of the control group (€63), and 72% of the unconditional distribution in the sample of non-treated (€35), which are remarkable shifts. The *many-for-success* treatment is negative and reduces the size of the contribution by slightly less than €8 but this is not precisely estimated, suggesting that reminding people about the risk of free riding operates mostly at the extensive margin and works to increase the number of those opposed to or undecided about the fund. The interaction terms capturing joint exposure to the *cost* and *many-for-success* treatments are small and not statistically different from zero. Hence, the hypothesis that they are both equal to zero is not rejected (*p*-value =0.891). Accordingly, the estimates in column 2 restrict these effects to zero, improving the precision of the estimates, while leaving the economic effects basically unchanged.

To gauge how much a campaign to raise awareness on hydrogeological risks would boost people's WTP we used the estimates to produce a back-of-the-envelope calculation. Without any treatment, 52.1% of the population would be willing to support the fund and would contribute an average of €63.4 (Table 4). Since the number of Italian households is approximately 25 million, at the baseline the fund would be around €826 million $(63.4 \times 0.521 \times 25)$. Suppose now that the whole adult Italian population were exposed to the first-stage treatment. Computing the effects at the extensive and intensive margins implied by the Tobit estimates in column 2, the T2 treatment would have two effects: to increase the fraction of supporters by 6 percentage points to 58.1% and would increase the average amount

contributed conditional on supporting the fund, by €11.9, to €75.3. The extra amount added to the fund through the extensive margin is €113 million ($75.3 \times 0.06 \times 25$). The extra amount added through the intensive margin is €155 million ($11.9 \times 0.521 \times 25$). The overall increase in the contributions to the fund induced by the treatment would be €268 million per year, an increase of 32% on its initial value.

This is a remarkable increase considering that currently the losses due to droughts caused by extreme weather are estimated to be €9 billion annually for the *whole* of the EU plus the U.K. (Naumann et al. 2021) and those due to rivers flooding are estimated to be at €7.6 billion (Dottori et al. 2023). Italy is one of the countries at the greatest risk of suffering a natural disaster such as an earthquake, floods, and landslides and the average losses due to these events represent 0.2% of GDP (Gizzi et al. 2016), or more than €3 billion each year.

4. Robustness checks and extensions

In this section we check the sensitivity of the results by extending the baseline specification in four directions. We test whether the treatment effects are heterogeneous among the population, are affected by prior beliefs, and do not change if we control for demographic variables, environmental risk indicators, and political orientation. We also check if the treatments have an effect that extends beyond the period in which the individual is treated.

4.1. Heterogeneity of responses for the information treatments

Our first extension consists of estimating the model based on different levels of awareness about the costs of environmental risks prior to our treatments. If all else being equal some groups were already aware of the costs of hydrogeological risks they should show a lower response to information campaigns. We proxy prior cost-awareness with education level. In our survey, education is the most reliable indicator of differences in prior information on the size and costs of environmental risks available, for instance because more highly educated people follow the news more intensively. Table 8 presents the marginal effects of the probit and Tobit regressions splitting the sample by college education.

In the group with college education the treatment effects are smaller than in the lower education group and are not statistically different from zero. This hold for both the probit and Tobit regressions. For instance, among individuals with lower levels of education, treatment T2

increases the probability of contributing significantly by 10.2 percentage points. Among those with a college degree, the treatment effect is about half that (5.7 points) and is not statistically different from zero. The most plausible explanation for this result is that individuals with college education are already aware of environmental risks and have already discounted their support for a fund, so adding T2 or T3 treatments does not have much effect on their willingness to contribute. Consistent with this interpretation, in the control group compared to respondents with lower education**,** college graduates are 15 percentage points more likely to already support the fund (T1G1) and be willing to contribute €22 more.[8]

Response heterogeneity among education groups provides valuable insights that help to counter potential criticism of our measures of WTP that they may merely reflect "cheap talk" and respondents overstate their WTP due to a lack of incentives to reveal their true values. The observation that college graduates do not respond to the treatment whereas those with lower education do, suggests that this assumption of cheap talk being independent of education is not warranted.

For instance, cheap talk could also upward bias responses to the information treatments. In this scenario, we would expect college-educated individuals who report higher WTP when not treated, to be more sensitive to the treatment. However, we observe the opposite pattern, that is findings do not support this expectation.

4.2. Prior beliefs

Our main treatments are meant to shift knowledge about the *consequences* of hydrogeological disasters, not their *frequency*. The outcome we study is WTP, not posterior beliefs. The treatment most likely affects consumer utility, conditional on occurrence of a disaster, and the effect on the outcome should reflect the change in utility caused by the

[8] We also checked for a source of heterogeneity in the pre-treatment information by examining whether the treatment effect was weaker for individuals living close to an area that had suffered a catastrophic event, i.e. the presumption that proximity to an event raises awareness. In September 2022 just under a year before the four provinces of Emilia Romagna experienced the May 2023 flood, the neighboring Marche region experienced floods that resulted in victims and damage. In the control group, residents of Emilia and Marche reported higher pre-treatment WTP: the proportion of those in favor of contributing is 61% (against 51% in the other regions), and the amount of the contribution conditional on participation is €68. The pattern shown in the results in Appendix Table A2 is similar to the education split. Compared to residents in other regions of Italy, residents in Emilia and Marche who had experienced serious flooding and thus, were more likely to be better informed about the consequences of flood risk did not respond to the treatments. However, the large standard errors due to small sample size in these regions do not allow reliable inferences.

treatment. However, the treatment may also affect the outcome because it shifts respondents' belief away from the prior.

Suppose the WTP of individual i, $y_i = f(\pi_i, u_i, k_i, s_i)$ is a function of the individual's beliefs about the occurrence of a disaster, π_i, the associated utility, u_i , the cost of contributing k_i, and a signal from the information treatment, s_i. For instance, the decision to contribute may be based on the solution to an optimization problem where the individual chooses y_i in order to maximize the expected utility from contributing to the fund net of the cost of the contribution:

$$max_{y_i}: \pi_i(s_i)u_i\big(y_i, s_i, d = 1\big) + \big(1 - \pi_i(s_i)\big)u_i\big(y_i, s_i, d = 0\big) - k_i y_i \quad (2)$$

where $d = 1$ if a hydrogeological disaster occurs. We let the information signal s_i affect both the belief π_i and the utility from contributing to the fund which depends on whether or not a disaster occurs. If individual beliefs follow a Bayes rule, then

$$\pi_i = \alpha_0 p_i + (1 - \alpha_0)s_i$$

where p_i is the prior probability of a hydrogeological disaster before the individual receives the information treatment. The parameter α_0 measures the informativeness of the signal and thus its ability to shift beliefs away from the prior. If the information treatments have no effect on the posterior belief then $\alpha_0 = 1$ but if the treatments effect on beliefs is large α_0 will be close to zero. The effect of the prior on WTP is:

$$\frac{dy_i}{dp_i} = \frac{dy_i}{d\pi_i}\frac{d\pi_i}{dp_i} = \frac{dy_i}{d\pi_i}\alpha_0$$

Since $\frac{dy_i}{d\pi_i} > 0$, regression of the WTP on the prior provides information about whether the treatments affect the WTP by also shifting beliefs. Following Coibion et al. (2018), to the baseline specification we add: (a) a control for prior belief p_i – the respondent's subjective probability of a hydrogeological disaster elicited in the first wave of the survey[9]; (b) the interactions between p_i and all the treatments. Specifically, we estimate:

[9] The question posed in the first wave was: "*Now you will read about a series of serious events. Think about each of these events and indicate on a scale of 1 to 100 how likely you think each event is to occur in the next 5 years*

$$y_i = \beta_1 T_2 + \beta_2 T_3 + \beta_3 G_2 + \gamma_0 p_i + \gamma_1 p_i T_2 + \gamma_2 p_i T_3 + \gamma_3 p_i G_2 + \varepsilon_i \quad (3)$$

Since the coefficients of T2G2 and T3G2 in all previous specifications are not statistically different from zero, here we set their effects to zero. The parameter γ_0 captures the joint effect of the prior probability of a disaster on the posterior and of the latter on the WTP in the control sample. The coefficients of the interaction terms in equation (3) – the parameters $\gamma_1, \gamma_2, \gamma_3$ – reveal whether the treatments affect the distance between the prior and posterior beliefs, and thus if the treatments affect the WTP because they causally affect the beliefs.

Table 9 reports the estimates of equation (3). Prior belief about the probability of a disaster has a positive and significant effect on the WTP in both the probit and Tobit estimates, suggesting that the posterior is affected by the prior and that more pessimistic beliefs increase the WTP. The interactions between the prior and first stage treatments are negative, implying that these treatments attenuate the dependence of the posterior belief on the prior. This suggests that the treatment although not explicitly targeting the frequency of hydrogeological risk, does affect the respondents' WTP by shifting beliefs and increasing the posterior probability.

The point estimates imply large economic effects. For example, for individuals with a prior that is one standard deviation below the mean of the cross-sectional distribution (and there is room for the information treatment to have an influence) treatment T2 increases the probability of supporting the fund by 10 percentage points, and for those with a prior one standard deviation above average it increases it by 5.9 points. However, the standard errors are too large to draw firm conclusions. We take this evidence suggesting weakly that T2 and T3 affect the WTP by also increasing beliefs about the occurrence of hydrogeological disasters but that most of the effects of the information treatments reflect a shift in the perceived costs of disaster occurrences.

To verify our approach, we conducted placebo tests replacing prior belief about a hydrogeological disaster with beliefs about the subjective probability of other disasters unrelated to hydrogeological risk. Appendix Table A2 reports the probit and Tobit estimates replacing the prior on hydrogeological risk with the probability that individuals assign to the

in our country, where 1 indicates that you think it is very unlikely" and 100 that you think it is "very likely". One of the events is "*natural disasters linked to climate change (floods, droughts, landslides, fires, etc.)*".

occurrence within five years of three events: another pandemic of similar intensity to COVID-19, a large-scale conflict leading to nuclear war, and collapse of the financial markets comparable to that in 2008. None of these prior beliefs should affect the baseline which is the WTP in the control group ($\gamma_0 = 0$), or the interaction of these beliefs with the treatments. The results indicate that none of these placebos affect the WTP which confirms the validity of our strategy to control for the influence of prior beliefs about hydrogeological risks.

4.3. Controlling for observables

Table 10 presents the probit and Tobit estimates controlling now for two groups of variables. The first group includes a set of demographic variables: gender, age, family size, education, region of residence, employment status, income, and home ownership. The second set includes three variables: the subjective probability of the occurrence of a natural disaster within the next five years, an indicator measuring "objective" environmental risk (described in section 4.1), and a dummy for political orientation.

The probability of contributing to the fund is positively related to education and economic resources (income and home ownership). It is also positively related to perceived risk of natural disasters and a leftist political orientation but is not sensitive to "objective" indicators of environmental risk. Education, income, and home ownership are also associated with a lower level of uncertainty about the decision to contribute. Most importantly in the context of our study is that the effects of the first and second treatments in these extended specifications are similar to those in Tables 5 and 7 which given our randomized experiment is as expected.

4.4. Long memory of treatments

An important question is whether information treatments have an effect that extends beyond the period in which the individual is treated. To check this, we use data from ISCE wave 3 (April 2024), merged with a panel from wave 1 (October 2023), the treatments in wave 2 (January 2024), and the WTP elicited in the same format in wave 3 (April 2024).

Table 11 reproduces the regressions in Table 9 using the prior beliefs from wave 1.[10] We observe no evidence that the wave 2 random treatments (T or G) affect the WTP three months later. Instead, we observe that prior beliefs (elicited in October 2023, wave 1) have an impact

[10] The sample size reduces to 3,743 observations because some individuals dropped out of the panel in April. Sample means of the WTP in April are similar to those elicited in January: the proportion willing to contribute to the fund is 49%, undecided are 32%, and opposers are 19%.

on the WTP in wave 3 (April 2023). The marginal effect in the probit regressions is of the same order of magnitude as in Table 9 (0.14 against 0.12) and is precisely estimated and somewhat smaller in the Tobit.

These results suggest that providing information on the consequences of hydrogeological disasters increases the WTP only in the short term, with the effect vanishing after a few months. This could be interpreted in terms of a one-off campaign having only a temporary effect because it is competing with efforts from other agents to downplay the importance of environmental risks and run conflicting campaigns. Our regressions show that prior beliefs have persistent effects on the WTP, indicating that information campaigns matter but need to be repeated frequently to gradually change people's beliefs and attitudes about investing in environmental improvements and disaster protection.

5. Conclusions

We implemented a survey experiment based on a representative panel of 5,000 Italian individuals interviewed at quarterly frequency, starting in October 2023. We elicited survey participants willingness to contribute to a public fund to finance investment to contain environmental change and secure areas exposed to hydrogeological risk under different information treatments.

We found that providing information on the consequences of hydrogeological risk result in increased support for a public fund and the WTP for the policy. Compared to the control group, individuals exposed to the information treatment on the costs of hydrogeological events were around 9 percentage points more likely to support the fund and willing to contribute an additional €25 to the fund. About half of the effect of the treatment on the willingness to contribute comes from those who initially opposed the fund and from those who were undecided about contributing. Applying the information treatment to the entire working-age population could raise as much as €0.26 billion per year. This could cover up to 42% of the currently estimated annual cost of the investment necessary in Italy to reduce economic damage due to hydrogeological risk by a factor of 4 and to reduce the population exposed by 84% (see Dottori et al., 2023).

We provide evidence of how individual WTP depends on the individual's knowledge that success of the policy depends critically on the WTP of the other citizens. More generally, we

show that dissemination of information is effective for achieving consensus over accumulation of funding for climate change mitigation policies.

Our findings have implications for the design of information campaigns. First, our results suggest that people have a stronger response to damage to human life than to economic damage which shows where the emphasis should be in information about climate change. Second, there is considerable heterogeneity in public awareness regarding the costs of climate change, with those less informed being more responsive to the information treatments. Since disseminating information is costly, targeted strategies using artificial intelligence could enhance cost-effectiveness. Additionally, raising awareness among the less well informed and the undecided could increase the consensus on climate funding policies among those already aware of the risks, due to the expected broader participation of the population and reduced likelihood of free riding.

Our results suggest also that one-off campaigns increase the WTP only in the short run, and to be effective campaigns should not be time limited. Finally, our results imply that because people's support for climate policies is influenced by information, they could also be swayed by biased information. Not all campaigns are truthful. Climate policies impose transition costs and may affect existing financial interests. Owners of these interests have a stronger motivation to downplay or deny the costs of climate change and launch biased campaigns. This suggests that consensus-building measures must be long-term and continuous to counter the large amounts of strategic dissemination of information by parties with conflicting interests.[11]

[11] The clearest example of these strategies are the ones put in place by oil producing companies which, according to Alan Gore, “have used fraud and falsehood on an industrial scale…” in order to attenuate people concerns and fears about climate change. One strategy, pursued for instance by Exxon, has been to finance TV ads (see here and here) which argued that Exxon was working to "revolutionize biofuels" to produce "fewer emissions" by making fuels from algae. One of their TV ads said, "You wouldn't BELIEVE the potential it shows!" Exxon conflict of interest is obvious.

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Table 1. The structure of information treatments

First stage randomization: "*Describe flood consequence*"	T1 Control group	T2 Treatment: *N of deaths*	T3 Treatment: N *of deaths plus damages*	T1 Control group	T2 Treatment: *N of deaths*	T3 Treatment: *N of deaths plus damages*
Second stage randomization: "*Evoke free riding*"		G1: No treatment			G2: Treatment: *Fund success depends on how many contribute*	
			WTP asked to all			

Table 2. Summary statistics in the randomized samples

	T1	T2	T3	G1	G2	All
Age	48.19	48.358	47.66	48.114	48.024	48.07
Male	.487	.495	.502	.492	.497	.495
Married	.531	.56	.54	.544	.544	.544
Family size	2.80	2.76	2.77	2.77	2.79	2.78
High school	.449	.423	.456	.462	.424	.443
College	.232	.24	.224	.221	.243	.232
Centre	.195	.186	.195	.191	.193	.192
South	.34	.335	.337	.337	.338	.338
Employed	.436	.411	.431	.421	.431	.426
Self-employed	.079	.095	.085	.097	.076	.086
Retired	.189	.192	.17	.182	.186	.184
Log income	7.573	7.593	7.571	7.592	7.566	7.579
Homeowner	.753	.772	.757	.77	.751	.761
Financial literacy	1.78	1.778	1.772	1.819	1.735	1.777
N. of observations	1,667	1,670	1,664	2,507	2,494	5,001

Note. The table reports variables means in each of the five randomized samples and in the total sample. Data are drawn from the January 2024 (wave 2) Italian Consumer Expectations Survey (ICES). Statistics are computed using sample weights.

Table 3. Balance tests

	T1	T2	T3	G1	G2
Age	0.001	-0.000	-0.000	-0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Male	-0.013	-0.003	0.016	-0.015	0.015
	(0.014)	(0.014)	(0.014)	(0.015)	(0.015)
Married	-0.028	0.022	0.006	0.002	-0.002
	(0.015)*	(0.015)	(0.015)	(0.016)	(0.016)
Family size	0.013	-0.008	-0.006	-0.009	0.009
	(0.007)**	(0.007)	(0.007)	(0.007)	(0.007)
High school	0.009	-0.025	0.015	0.023	-0.023
	(0.016)	(0.016)	(0.016)	(0.017)	(0.017)
College	0.010	-0.001	-0.009	-0.036	0.036
	(0.020)	(0.020)	(0.020)	(0.022)*	(0.022)*
Centre	0.008	-0.013	0.005	-0.004	0.004
	(0.018)	(0.018)	(0.018)	(0.019)	(0.019)
South	0.004	-0.002	-0.002	0.011	-0.011
	(0.016)	(0.016)	(0.016)	(0.017)	(0.017)
Employed	0.025	-0.017	-0.008	-0.004	0.004
	(0.017)	(0.017)	(0.017)	(0.018)	(0.018)
Self-employed	-0.017	0.030	-0.013	0.067	-0.067
	(0.027)	(0.026)	(0.027)	(0.028)**	(0.028)**
Retired	0.028	0.007	-0.036	-0.018	0.018
	(0.026)	(0.025)	(0.026)	(0.027)	(0.027)
Log income	-0.010	0.015	-0.005	0.025	-0.025
	(0.015)	(0.015)	(0.015)	(0.016)	(0.016)
Homeowner	-0.018	0.018	0.000	0.018	-0.018
	(0.016)	(0.016)	(0.016)	(0.017)	(0.017)
Financial literacy	0.003	-0.003	-0.000	0.018	-0.018
	(0.007)	(0.007)	(0.007)	(0.007)**	(0.007)**
N. of observations	5,001	5,001	5,001	5,001	5,001

Note. The table reports probit regressions for the probability of inclusion in the 5 randomized subsamples. We report average marginal effects, and in parentheses heteroskedasticity consistent standard errors. One star indicates statistical significance at the 10%, two stars at the 5%, three stars at the 1%.

Table 4. Summary statistics for willingness to contribute to the fund

	Control group T1/G1	Total sample
Support to the fund		
% Yes	52.1	54.6
% No	18.4	15.9
% I don't know	29.5	29.5
N. of observations	840	5,001
Amount willing to contribute if "Yes"		
		.
5th pct	7.5	7.5
10th pct	7.5	7.5
25th pct	7.5	7.5
Median	25	35
75th pct	75	75
90th pct	150	150
95th pct	250	250
Mean	63.4	73.48
Standard deviation	119.4	158.0
Skewness	5.97	5.28
N. of observations	438	2,731

Note. The table reports sample statistics on willingness to contribute to the fund, and amount of the contribution, separately for the control group (T1G1) and the total sample. Statistics are computed using sample weights.

Table 5. The effect of treatments on the probability of WTP

Treatment	Probit	Probit
T2	0.093	0.085
	(0.024)***	(0.017)***
T3	0.072	0.080
	(0.024)***	(0.017)***
G2	-0.060	-0.060
	(0.024)**	(0.014)***
T2G2	-0.017	
	(0.034)	
T3G2	0.016	
	(0.034)	
P-value test : $\beta_1 = \beta_2$	0.388	0.799
P-value test $\beta_4 = \beta_5 = 0$	0.629	
Average of LHS variable	0.521	0.521
N	5,001	5,001

Note. The table reports marginal effects calculated from probit regressions for the probability of contributing to the fund. Heteroskedasticity consistent standard errors are reported in parentheses. One star indicates statistical significance at the 10%, two stars at the 5%, three stars at the 1%. The table also reports the p-values of a chi-square test of the listed null. The estimated equation is $y_i = \beta_1 T_2 + \beta_2 T_3 + \beta_3 G_2 + \beta_4 T_2 G_2 + \beta_5 T_3 G_2 + \varepsilon_i$.

Table 6. Ordered probit estimates

Treatment	Marginal effects on:	Ordered probit	Ordered probit
T2	Oppose	-0.055	-0.055
		(0.014)***	(0.010)***
	Undecided	-0.035	-0.035
		(0.009)***	(0.006)***
	Support	0.089	0.089
		(0.023)***	(0.016)***
T3	Oppose	-0.041	-0.053
		(0.014)***	(0.010)***
	Undecided	-0.026	-0.034
		(0.009)***	(0.006)***
	Support	0.067	0.086
		(0.023)***	(0.016)***
G2	Oppose	0.034	0.026
		(0.014)**	(0.008)***
	Undecided	0.022	0.017
		(0.009)**	(0.005)***
	Support	-0.055	-0.043
		(0.022)**	(0.013)***
T2G2	Oppose	-0.000	
		(0.019)	
	Undecided	-0.000	
		(0.012)	
	Support	0.000	
		(0.032)	
T3G2	Oppose	-0.024	
		(0.019)	
	Undecided	-0.015	
		(0.012)	
	Support	0.039	
		(0.032)	
P-value test : $\beta_1 = \beta_2$		0.332	0.833
P-value test $\beta_4 = \beta_5 = 0$		0.381	
N		5,001	5,001

Note. The table reports marginal effects of the various treatments calculated from ordered probit regressions for the probability of contributing to the fund (Support), being undecided whether to support or not (Undecided) and not contribute (Oppose). The estimated equation is $y_i = \beta_1 T_2 + \beta_2 T_3 + \beta_3 G_2 + \beta_4 T_2 G_2 + \beta_5 T_3 G_2 + \varepsilon_i$. The last column reports marginal effects of the treatments when the estimated model restricts the effects of the joint first and second stage treatments to zero. Heteroskedasticity consistent standard errors are reported in parentheses. One star indicates statistical significance at the 10%, two stars at the 5%, three stars at the 1%. The table also reports the p-values of a chi-square test of the listed null.

Table 7. Tobit estimates of the effect of treatments on WTP

Treatment	Tobit	Tobit
T2	28.878	27.481
	(9.724)***	(7.066)***
T3	22.351	24.1888
	(9.734)**	(7.097)**
G2	-7.859	-7.558
	(9.989)	(5.607)
T2G2	-2.832	
	(13.897)	
T3G2	3.744	
	(13.922)	
P-value test : $\beta_1 = \beta_2$	0.497	0.631
P-value test $\beta_4 = \beta_5 = 0$	0.891	
Average of LHS variable	73.48	73.48
N. of observations	5,001	5,001

Note. The first regression reports marginal effects calculated from Tobit regressions for the amount that respondent intend to contribute to the fund. The estimated equation is $y_i = \beta_1 T_2 + \beta_2 T_3 + \beta_3 G_2 + \beta_4 T_2 G_2 + \beta_5 T_3 G_2 + \varepsilon_i$.. The second column restricts to zero the effects of the joint first-stage and second stage treatments. Heteroskedasticity consistent standard errors are reported in parentheses. One star indicates statistical significance at the 10%, two stars at the 5%, three stars at the 1%. The table also reports the *p*-values of a chi-square test of the listed null.

Table 8. The effect of treatment on WTP, by education

	Probit		Tobit	
Treatment	No college	College	No college	College
T2	0.102	0.057	31.867	18.564
	(0.027)***	(0.051)	(11.035)***	(20.378)
T3	0.087	0.012	26.659	6.954
	(0.027)***	(0.050)	(11.070)**	(20.252)
G2	-0.064	-0.071	-12.657	-0.705
	(0.028)**	(0.048)	(11.512)	(20.113)
T2G2	-0.002	-0.053	2.223	-14.503
	(0.039)	(0.069)	(15.983)	(28.063)
T3G2	0.014	0.055	2.340	17.987
	(0.039)	(0.070)	(15.941)	(28.484)
N	3,841	1,160	3,841	1,160

Note. The table reports the marginal effects of probit and Tobit regressions for the probability of contributing to the fund and the amount that people are willing to contribute. We report average marginal effects and in parentheses heteroskedasticity consistent standard errors. One star indicates statistical significance at the 10%, two stars at the 5%, three stars at the 1%.

Table 9. The effect of treatments on WTP through beliefs

Treatment	Probit	Tobit
T2	0.125	39.01
	(0.039)***	(15.658)**
T3	0.078	28.69
	(0.039) **	(15.746) *
G2	-0.091	-4.87
	(0.032)***	(12.791)
Prior	0.119	46.496
	(0.053)**	(21.211)**
T2*Prior	-0.081	-27.75
	(0.065)	(27.709)
T3*Prior	-0.024	-15.76
	(0.065)	(25.734)
G2*Prior	0.039	-4.96
	(0.053)	(20.971)
N	4,197	4,197

Note. The table reports the marginal effects of probit and Tobit regressions for the probability of contributing to the fund and the amount that people are willing to contribute. We report average marginal effects and in parentheses heteroskedasticity consistent standard errors. One star indicates statistical significance at the 10%, two stars at the 5%, three stars at the 1%.

Table 10. The effect of the treatments on WTP, with demographic variables

	Probit	Probit	Tobit for extensive margin	Tobit for extensive margin
T2	0.101	0.101	31.149	23.673
	(0.023)***	(0.025)***	(9.673)***	(10.308)**
T3	0.078	0.082	25.494	24.704
	(0.023)***	(0.025)***	(9.675)***	(10.348)**
G1	-0.045	-0.042	3.116	3.790
	(0.023)*	(0.025)*	(9.956)	(10.508)
T2G2	-0.030	-0.031	-7.086	2.647
	(0.033)	(0.036)	(13.824)	(14.615)
T3G2	0.010	-0.021	0.891	-4.327
	(0.033)	(0.036)	(13.848)	(14.674)
Age	-0.000	-0.000	0.234	0.382
	(0.001)	(0.001)	(0.283)	(0.308)
Male	0.014	0.015	18.949	21.028
	(0.014)	(0.016)	(5.918)***	(6.435)***
Married	-0.026	-0.012	-9.586	-3.026
	(0.016)*	(0.017)	(6.497)	(6.908)
Family size	0.013	0.011	4.280	0.208
	(0.007)*	(0.007)	(2.814)	(3.034)
High school	0.052	0.045	18.700	15.592
	(0.016)***	(0.017)***	(6.889)***	(7.210)**
College	0.094	0.061	33.643	20.613
	(0.020)***	(0.022)***	(8.532)***	(8.949)**
Centre	0.051	0.049	6.407	13.079
	(0.019)***	(0.021)**	(7.603)	(8.529)
South	-0.006	-0.005	-3.562	0.858
	(0.016)	(0.019)	(6.781)	(7.871)
Employed	0.069	0.083	23.425	31.875
	(0.017)***	(0.020)***	(7.159)***	(8.246)***
Self-employed	0.049	0.071	25.265	25.944
	(0.026)*	(0.029)**	(11.117)**	(12.082)**
Retired	0.086	0.096	37.286	37.266
	(0.025)***	(0.027)***	(10.795)***	(11.370)***
Log income	0.054	0.046	29.787	28.176
	(0.015)***	(0.016)***	(6.170)***	(6.685)***
Homeowner	0.011	0.027	1.811	6.635
	(0.016)	(0.018)	(6.986)	(7.492)
Financial literacy	0.093	0.090	19.727	20.927
	(0.006)***	(0.007)***	(2.903)***	(3.110)***
Pr. of disaster		0.119		44.076
		(0.026)***		(10.574)***
Environmental risk		0.000		2.484
		(0.005)		(2.143)
Left-wing		0.091		17.391
		(0.016)***		(6.521)***
	5,001	4,197	5,001	4,197

Note. The table reports marginal effects calculated from probit and Tobit regressions for the probability of contributing to the fund and the amount that people are willing to contribute. Heteroskedasticity consistent standard errors are reported in parentheses. One star indicates statistical significance at the 10%, two stars at the 5%, three stars at the 1%. The table also reports the p-values of a chi-square test of the listed null.

Table 11. The effect of treatments on WTP, wave 3 sample

Treatment	Probit	Probit	Tobit	Tobit
T2	-0.015	-0.015	-8.975	-1.727
	(0.042)	(0.020)	(10.292)	(4.868)
T3	0.016	-0.017	-9.048	-4.262
	(0.041)	(0.020)	(10.316)	(4.893)
G2	-0.004	0.011	4.471	-4.405
	(0.040)	(0.019)	(9.990)	(4.661)
Prior	0.136	0.138	28.430	23.430
	(0.069)**	(0.028)***	(16.918)*	(6.952)***
Prior*T2	0.001		13.560	
	(0.069)		(16.902)	
Prior*T3	-0.063		9.115	
	(0.069)		(16.876)	
Prior*G2	0.029		-16.321	
	(0.066)		(16.182)	
N	3,743	3,743	3,743	3,743

Note. The table uses merged data from the three waves of ISCE. The prior refers to wave 1 (October 2023), the treatments refer to wave 2 (January 2024), while WTP refers to wave 3 (April 2024). The table reports the marginal effects of probit and Tobit regressions for the probability of contributing to the fund and the amount that people are willing to contribute. We report average marginal effects and in parentheses heteroskedasticity consistent standard errors. One star indicates statistical significance at the 10%, two stars at the 5%, three stars at the 1%.

Appendix

Table A1. Comparison between ISCE and SHIW

	ISCE	SHIW
Male	0.48	0.49
Female	0.52	0.51
Age 18-34	0.26	0.23
Age 35-54	0.39	0.37
Age 55-75	0.35	0.40
Family size = 1	0.12	0.13
Family size = 2	0.30	0.25
Family size = 3	0.29	0.27
Family size = 4	0.23	0.25
Family size >= 5	0.06	0.10
Primary education	0.32	0.47
Secondary education	0.46	0.37
Tertiary education	0.22	0.16
Employees	0.44	0.39
Self-employed	0.09	0.13
Unemployed	0.13	
Not in the labor force	0.34	0.48
North	0.45	0.46
Centre	0.20	0.19
South and Islands	0.34	0.35
Total	**6,483**	**11,373**

Note: The table compares sample means of selected demographic variables in the ISCE (2023) and in the SHIW (2020). In the SHIW we consider individuals between 18 and 75 years old. In ISCE we consider all respondents interviewed for the first time in the various waves. Means are computed using sample weights in both surveys.

Table A2. The effect of treatments on WTP, by region of residence

	Probit		Tobit	
	Other regions	Romagna e Marche	Other regions	Romagna and Marche
T2	0.095	0.055	28.096	25.678
	(0.025)***	(0.080)	(9.815)***	(41.283)
T3	0.069	0.093	23.205	8.507
	(0.025)***	(0.083)	(9.794)**	(42.424)
G2	-0.064	-0.047	-10.876	13.930
	(0.025)**	(0.079)	(10.103)	(41.863)
T2G2	-0.012	-0.030	1.326	-31.725
	(0.036)	(0.110)	(14.063)	(57.550)
T3G2	0.012	0.110	-1.704	75.165
	(0.036)	(0.116)	(14.078)	(58.286)
N	4,573	428	4,573	428

Note. The table reports the marginal effects of probit and Tobit regressions for the probability of contributing to the fund and the amount that people are willing to contribute. We report average marginal effects and in parentheses heteroskedasticity consistent standard errors. One star indicates statistical significance at the 10%, two stars at the 5%, three stars at the 1%.

Table A3. The effect of treatment on WTP through beliefs – placebo tests

	Probit			Tobit		
	Pandemic	War	Financial crisis	Pandemic	War	Financial crisis
T2	0.111	0.118	0.087	25.252	31.562	33.003
	(0.029)***	(0.030)***	(0.033)***	(11.458)**	(11.713)***	(13.046)**
T3	0.103	0.093	0.099	18.692	21.991	31.591
	(0.029)***	(0.030)***	(0.033)***	(11.459)	(11.795)*	(13.168)**
G2	-0.078	-0.064	-0.075	-9.236	-5.023	-2.569
	(0.024)***	(0.024)***	(0.027)***	(9.302)	(9.552)	(10.664)
Prior	-0.011	-0.042	-0.079	3.084	-1.747	6.261
	(0.056)	(0.052)	(0.055)	(22.102)	(21.004)	(22.008)
T2*Prior	-0.085	-0.096	-0.013	-3.643	-20.784	-22.220
	(0.067)	(0.063)	(0.067)	(26.491)	(25.218)	(26.487)
T3*Prior	-0.111	-0.071	-0.078	4.811	-4.436	-27.555
	(0.067)*	(0.063)	(0.067)	(26.620)	(25.220)	(26.580)
G2*Prior	0.025	-0.018	0.010	4.733	-7.571	-12.592
	(0.055)	(0.052)	(0.055)	(21.560)	(20.476)	(21.639)
N	4,197	4,197	4,197	4,197	4,197	4,197

Note. For the placebo tests, we consider three beliefs, elicited in the first wave of the survey (October 2023). Respondents are asked to indicate, on a scale from 1 to 100, how likely they think each event is to occur in the next 5 years in Italy. In column (1) the event is "a new pandemic, of similar intensity to Covid-19," in column (2) the event is "a large-scale conflict, leading to nuclear war," in column (3) the event is "a collapse of the financial markets comparable to that of 2008." Events are randomly rotated in the survey. Beliefs are standardized between 0 and 1 in the regressions. The table reports the marginal effects of probit and Tobit regressions for the probability of contributing to the fund and the amount that people are willing to contribute. We report average marginal effects and in parentheses heteroskedasticity consistent standard errors. One star indicates statistical significance at the 10%, two stars at the 5%, three stars at the 1%.