Charitable Behavior and Public Intervention: a Survey Experiment*

Francesca Leombroni[1] and Bence Szabó[2]

[1]Banca d'Italia , francesca.leombroni@phd.unibocconi.it

[2]Corvinus University of Budapest , Centre for Economic and Regional Studies , bence.szabo@uni-corvinus.hu

December 2, 2023

Abstract

In this paper, we measure the extent of charitable behavior crowding out public intervention and how this phenomenon affects the welfare of the poor. To achieve this objective, we collect novel survey data on a representative sample of the U.S. adult population. In the survey, respondents are asked to go through several hypothetical scenarios, constructed on the basis of a simple model of public good contribution to learn about their preferences and expectations regarding donations and taxation. We find that when donations are available, government expenditure on the poor is lower in equilibrium. Yet, households in need are better off due to disproportionately higher donations. Therefore, in our setting, private charity crowds out public intervention only to a limited extent, affecting equilibrium-level taxes only slightly. We also estimate the structural parameters of preferences in our sample and find that individuals assign a sizable weight to both the utility of the poor and to the act of donating itself. The large contribution of the latter component rationalizes why taxation alone cannot fully compensate for the absence of donations.

Keywords: Altruism, Charity, Donation, Public Good, Anti-Poverty, Welfare
JEL Classification: D1, D8, H3, H4, I3

*We thank our supervisors at Bocconi University, Pamela Giustinelli, Gianmarco Ottaviano, Joseph-Simon Görlach, Alexia Delfino, Carlo Devillanova, and Francesco Billari for the excellent guidance, and professors Thomas Le Barbanchon, Giacomo Battiston, Stefano Fiorin, Salvatore Nunnari, Nicola Pavoni, Guido Tabellini, and Fernando Vega-Redondo, and for their insightful comments. We are also thankful to the participants of the Bocconi University reading groups and seminars for their valuable comments, and to the Ph.D. School of Bocconi University for providing financial support for this project.

1 Introduction

Charitable behavior plays a vital role in nearly all societies. In the United States, donations account for more than 2% of the GDP (Andreoni and Payne, 2013), and more than 40% of the American households are involved in volunteering activities (Charities Aid Foundation, 2019). Similarly to taxation, private charity is a form of contribution to the public good. As such, the activity of charitable organizations is, to some extent, a substitute for public intervention. This is particularly true for areas such as poverty reduction, targeted by both charitable organizations and the public sector.[1] Some evidence of substitution between private charity and public intervention emerges from a cross-country comparison: among Western OECD countries, those that are characterized by a larger size of the government tend to show a lower prevalence of charity.[2]

The existence of some degree of substitution between charitable giving and public intervention has often been investigated in the literature, although most contributions have focused on one direction, that is whether government intervention could affect private donations through tax deductions (see for instance Schiff, 1985; Duncan, 1999; Brooks, 2000; Simmons and Emanuele, 2004; Garrett and Rhine, 2010; Bredtmann, 2016 and Peloza and Steel, 2005 for a meta-analysis of the estimates of the price elasticity of individual donations in the literature).

Whether the opposite direction is also relevant, that is whether the supply of private charity affects the extent of public intervention, has received considerably less attention. Becker and Lindsay (1994) and Sav (2012) find evidence for partial crowding out in the funding of US higher education; Heutel (2014) finds no evidence of private donations crowding out government grants to charities (while confirming that government grants crowd in private donations) while Werfel (2018) provides evidence that individuals are less likely to support higher taxation when informed of the size of charitable contributions in society.

While most contributions agree that the crowding out is not one-to-one in either direction,

[1] In the U.S., 35% of the donations as of 2017 were directed towards organizations in health, education, and human services, while more than 30% targeted religious organizations, most of which are also involved in poverty relief activities according to the nonprofit organization Charity Navigator https://www.charitynavigator.org/, accessed 06/01/2022.

[2] See for instance OECD (2021), Charities Aid Foundation (2019).

ruling out perfect substitution[3], answers concerning the size and even the direction of the relationship between charitable giving and public intervention are still discordant. Identifying a causal effect in either direction is difficult using observational data, as charitable giving does not happen in a vacuum; it is affected heavily by several unobserved confounders and equilibrium mechanisms.

In this paper we set to contribute to this debate with a survey experiment, by providing a causal estimate of the degree of crowding out in both directions. We identify and measure the impact of an increase in public intervention on private donations, and of its opposite, namely the effect of 'switching off' donations on tax preferences. To build the survey experiment, we rely on a simple framework that enriches the traditional models of public good contribution (Becker, 1974; Bergstrom et al., 1986) with elements that are typical of the more recent literature that investigates the determinants of private charity, such as impure altruism and reputational concerns (Andreoni, 1988, 1990; Bénabou and Tirole, 2006; Katz and Rosenberg, 2005).

We present a sample of 380 U.S. respondents[4] with hypothetical but realistic scenarios in which we vary the availability of donations and the respondents' gross income to measure the change in their taxation preferences. We also elicit respondents' donation choices at different taxation levels and their expectations about the average level of donations in society. Based on their answers, we simulate equilibrium outcomes in our public good model setting. The results of this exercise allow us to compare equilibrium tax rates and the welfare of the poor with and without donations available. Additionally, we conduct heterogeneity analyses based on the respondents' characteristics and elicited preferences and link them to their in-survey preferred levels of taxes and donations.

We find that government expenditure on the poor is lower when donations are available, but households in need are still better off due to disproportionately higher donations. In our setting, private charity crowds out public intervention only to a limited extent; equilibrium tax rates in the no-donations scenario are not high enough to compensate for the lack of

[3]Among the possible explanations for the lack of a complete crowding out, Eckel et al. (2005) highlight how individuals do not fully internalize their contribution to the government finances and, therefore, indirectly to the public good through taxation (fiscal illusion).

[4]The sample was selected by the survey company Prolific to be representative of the population of the United States according to gender, age bracket, and ethnicity.

private charity, suggesting that people are also driven by the direct utility of the act of donating (*warm glow*). We confirm this finding by retrieving the structure of preferences which generates the behaviors we elicit in the hypothetical scenarios with individual-level estimates of the main utility parameters of our model (generosity, warm glow and weight of reputational concerns). While the estimated average generosity in our sample is higher than the weight of the direct utility of donations, the latter component is positive and relatively large in magnitude: direct utility from donations (the *warm glow* component) is assigned an average weight of nearly 3% of the utility of one's own consumption, compared with a value of 6.6% for the weight of the utility of the poorest members of society (the generosity component). Reputational concerns are instead assigned a lower weight, at 0.2%. Overall, our results suggest that the widespread availability of private charity in the United States plays a pivotal role in alleviating poverty, which government intervention cannot substitute for due to the structure of voters' preferences.

The paper proceeds as follows: Section 2 describes the model and derives some predictions, Section 3 describes the survey and the characteristics of the sample, Section 4 presents our results, while Section 5 concludes.

2 A simple framework

We now provide an overview of a simple theoretical framework to guide the construction of the hypothetical scenarios in our survey. We are interested in the redistribution effects of the availability of charity in general equilibrium, where households form expectations over the charitable behavior of others which in turn affect their own ideal taxation levels. The latter are then reflected in the social choice of taxation with and without donations: if the expectations of households were substantially higher than the actual donation behavior of others, each household might prefer a suboptimally low level of taxes, leaving the poorest households potentially worse off when donations are available. However, if donations affected individual utility not only through their contribution to the benefit of poor households, but also directly (through a sizable enough *warm glow* component), incentives for charity could be largely beneficial for the poor.

We build a simple public good model where households derive utility from their own consumption, the public good, and their contribution to the public good[5]. In our setting, the society is composed of N_p households earning positive income, and N_z households earning zero income, and the public good is defined as the financial support accruing to zero-income households. Positive-income households can contribute to the public good through two channels: taxation and private donations. Their own donations, the expected level of donations, and the welfare of the households in need enter the optimal consumption choice of households, so that the value of the problem will depend on the level of taxes, allowing to pin down the preferred level of taxation for each household. The utility function of the households reflects inequity, warm glow, and reputational concerns. Finally, a neutral government sets the tax rate in accordance with the preferences of the median voter.

2.1 Baseline case: no charity

We first describe a simpler version of our model, where households earning a positive income can contribute to the public good only through taxation. Positive-income households maximize their utility, given by:

$$u(c_i, b) = log(c_i) + \alpha_i log(b).$$

where c_i is consumption, α_i is the *generosity* or *pure altruism* parameter, representing the weight of the public good in the utility function, and b is the public good, i.e. the transfer accruing to each household-in-need:

$$b = \frac{1}{N_z}(\tau - \underline{\tau})W,$$

where $W = \sum_{i=1}^{N_p} w_i$ s the total wage mass, τ is the tax rate selected by the government to support the households in need, and $\underline{\tau}$ is the fraction of total taxes devoted to the upkeep of the government, which is fixed at 20% of the gross wage.

Positive-income households cannot consume more than their net income w_i, resulting in

[5]Adapting the frameworks of Andreoni (1988) and Duncan (1999).

the following budget constraint:

$$c_i \leq (1-\tau)w_i.$$

Finally, zero-income households are characterized by the following utility function:

$$u(b) = log(b)$$

2.1.1 Solving for the preferred tax rate

In the baseline case where no charity is allowed, consumption is always set at the maximum available level $c_i = w_i(1-\tau)$. We can therefore solve for the preferred tax rate of each positive-income household, τ_i^*, by maximizing the value of the problem,

$$V(w_i, W, \tau, N_z) = log\big((1-\tau)w_i\big) + \alpha_i log\bigg(\frac{1}{N_z}(\tau - \underline{\tau})W\bigg).$$

This implies the following first-order condition and optimal taxation:

$$\frac{\partial V(w_i, W, \tau, N_z)}{\partial \tau} = -\frac{1}{(1-\tau_i^*)} + \frac{\alpha_i}{(\tau_i^* - \underline{\tau})} = 0 \tag{1}$$

$$\tau_i^* = \frac{\alpha_i + \underline{\tau}}{1+\alpha_i}. \tag{2}$$

Deriving the preferred tax rate τ_i^* with respect to the degree of inequity aversion α_i, we obtain:

$$\frac{\partial \tau^*}{\partial \alpha_i} = \frac{1-\underline{\tau}}{(1+\alpha_i)^2} > 0, \tag{3}$$

meaning that the preferred tax rate is increasing in inequity aversion.

Zero-income households instead simply wish to maximize the amount of public good, and therefore prefer the highest possible tax rate (which we assume bounded above by some amount τ^H). When donations are not allowed, α_i is pinned down by preferred taxes:

$$\alpha_i = \frac{\tau_i^* - \underline{\tau}}{1-\tau_i^*}$$

2.2 The government's problem

We close the model by solving the government's problem. The government knows the preferences of each household and sets the tax rate τ to match as closely as possible the preferences of the median voter. It, therefore, minimizes the sum of absolute deviations from each citizen's preferred tax rate:

$$\tau = \arg\min_{\tau' \geq \underline{\tau}} \sum_{i=1}^{N_p+N_z} |\tau_i^* - \tau'|$$

This expression is indeed minimized by choosing the median of the population's preferences, which is equivalent to the preferred tax rate of the median voter[6].

2.3 Complete case: reintroducing private charity

We now reintroduce private charity in the picture and present the complete framework. Positive-income households can contribute to the welfare of the households in need, both paying taxes and engaging in private charity. Their objective function is now:

$$\begin{aligned} u(c_i, d_i; d_{-i}, b) = & \, log(c_i) + \gamma_i log(1 + d_i) + \alpha_i log(\mathbb{E}[b|\tau]) \\ & + \eta_i \Big(log(1 + (d_i - \mathbb{E}[d_{-i}|\tau])^2) \cdot \mathbb{1}\left[d_i \geq \mathbb{E}[d_{-i}|\tau]\right] \\ & - log\big(1 + (\mathbb{E}[d_{-i}|\tau] - d_i)^2\big) \cdot \mathbb{1}\left[d_i < \mathbb{E}[d_{-i}|\tau]\right] \Big), \end{aligned}$$

where, in addition to own consumption and the public good, utility depends on the amount of own donations (d_i) and on the deviation of own donations from the prevailing level of donations in the society, respectively weighted by γ_i, the *warm glow* parameter, that regulates the importance of one's own contribution to the public good in the utility function, and η_i, that is the weight of reputational concerns, or equivalently the cost of deviating from the social norm[7].

[6] Using a quadratic loss function would result in selecting the average of the ideal tax rates instead of the median.

[7] The role of reputational concerns in this context has been emphasized, for instance, by Bénabou and Tirole (2006)

The budget constraint is also modified to include donations:

$$c_i \leq w_i(1-\tau) - d_i.$$

It is important to highlight that now, differently from the simplified case with no donations, agents have to form expectations over the private charitable contributions of others. Indeed, they get utility (disutility) from both positive (negative) deviations between their own donations and the average societal level of donations, and from the total amount of public good, which is composed of taxes, own donations, and the not-yet-determined donations of other positive-income households in the society:

$$\mathbb{E}[b|\tau] = \frac{1}{N_z}\Big((\tau - \underline{\tau})W + d_i + \mathbb{E}\big[\sum_{j\neq i} d_j|\tau\big]\Big).$$

We can simplify this expression by allowing individuals to only form beliefs on the average level of donations in the society[8] conditional on the level of taxes:

$$\mathbb{E}[b|\tau] \approx \frac{1}{N_z}\Big((\tau - \underline{\tau})W + d_i + (N_p - 1)\mathbb{E}[d_{-i}|\tau]\Big),$$

The usual assumption of perfect rationality would require that agents' guesses matched the realized outcome. We choose not to make any assumption on the structure of beliefs and instead use our survey to test whether individuals hold accurate beliefs. For the sake of completeness, we will, however, present a brief analysis of the benchmark case, characterized by a representative household with rational expectations.

2.3.1 Benchmark case: representative agent with correct beliefs

In the benchmark case, the representative agent maximizes her utility while knowing that everybody else solves an identical problem. Since, in the benchmark case, all individuals have the same preferences and budget, we can treat expected donations such that the agent has correct beliefs about expected donations as if they were the solution to the individual

[8] Excluding themselves, which however, is of little importance for a big enough number of households

optimization problem,

$$V(w_i, W, \tau, N_z, N_p) = \max_{d_i} log\big((1-\tau)w_i - d_i\big) + \gamma_i log(1+d_i) + \alpha_i log\left(\frac{1}{N_z}\left((\tau - \underline{\tau})W + N_p \mathbb{E}[d_{-i}|\tau]\right)\right).$$

Since everybody is the same, the individual level of donation (d_i) coincides with the average societal level ($\mathbb{E}[d_{-i}|\tau]$), implying that the reputational concern term does not play any role. However, the individual decision maker, not internalizing this, still solves for her own level of donations as if her contribution was only infinitesimal for the overall benefit accruing to the unemployed so that the benefit term ($\mathbb{E}[b|\tau]$) is taken as given and does not appear in the first order condition.

The optimal level of donations thus results from maximizing the following first-order condition

$$\text{w.r.t. } d_i : \frac{1}{w_i(1-\tau) - d_i} = \frac{\gamma_i}{1+d_i} \tag{4}$$

$$d_i^* = max\left\{\frac{\gamma_i w_i(1-\tau) - 1}{1+\gamma_i}, 0\right\}. \tag{5}$$

The preferred level of donations is positive whenever:

$$\gamma_i \geq \frac{1}{w_i(1-\tau)},$$

meaning that there will be a positive level of donations in society whenever the level of warm glow is above a certain threshold (equal to at least the inverse of the net wage).

From 5, the optimal level of consumption can also be retrieved as:

$$c_i^* = min\left\{\frac{w_i(1-\tau) - 1}{1+\gamma_i}, w_i(1-\tau)\right\}.$$

Assuming a high enough level of warm glow, we can plug back the values of the interior

solution to obtain the value of the problem in the benchmark case:

$$V(w_i, W, \tau, N_z, N_p) = log\left(\frac{w_i(1-\tau)-1}{1+\gamma_i}\right) + \gamma_i log\left(\frac{\gamma_i w_i(1-\tau)-1}{1+\gamma_i}\right) + \alpha_i log\left(\frac{1}{N_z}\left((\tau-\underline{\tau})W + N_p\frac{\gamma_i w_i(1-\tau)-1}{1+\gamma_i}\right)\right),$$

from which we can compute the preferred tax rate of household i, τ_i^*, by finding the tax rate maximizing the value of her problem. Considering that $W = N_p w_i$, the first order condition with respect to τ,

$$\frac{\partial V(w_i, W, \tau, N_z, N_p)}{\partial \tau} = -\frac{w_i}{w_i(1-\tau)-1} - \frac{\gamma_i^2 w_i}{\gamma_i w_i(1-\tau)-1} + \frac{\alpha_i w_i}{(1+\gamma_i)(\tau-\underline{\tau})w_i + \gamma_i w_i(1-\tau)-1} = 0$$

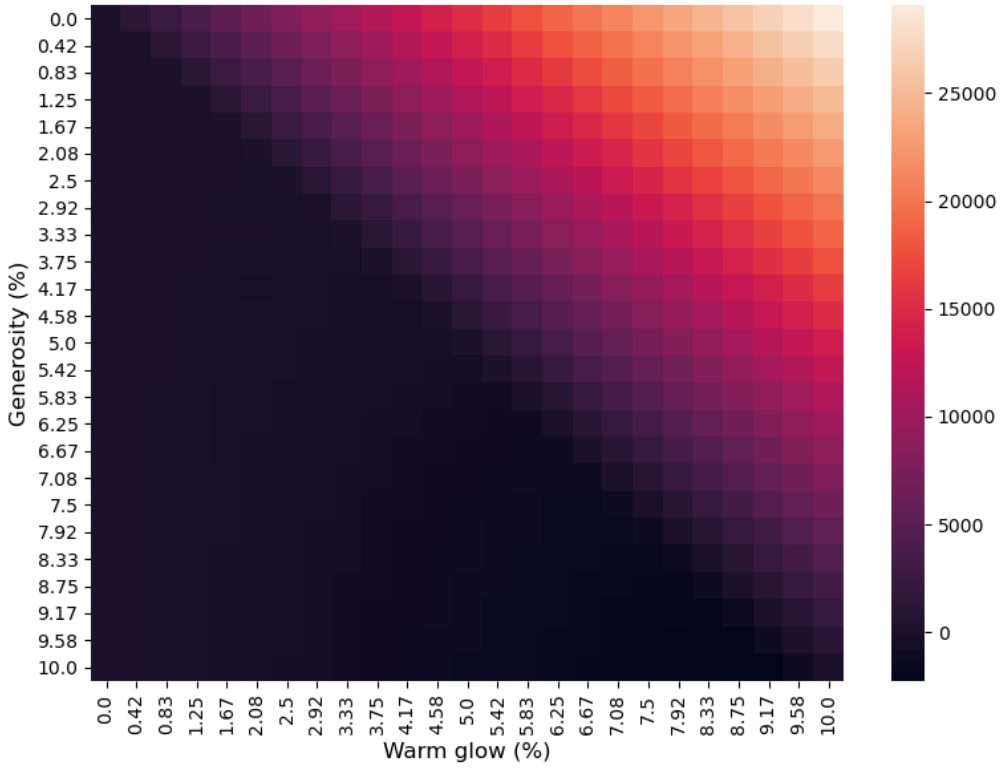
implies that:

$$\frac{1}{w_i(1-\tau)-1} + \frac{\gamma_i^2}{\gamma_i w_i(1-\tau)-1} = \frac{\alpha_i}{(1+\gamma_i)(\tau-\underline{\tau})w_i + \gamma_i w_i(1-\tau)-1},$$

which can be solved numerically for the preferred tax rate, τ^*.

Solving the problem for different values of the preference parameters governing inequity aversion (α) and warm glow (γ), we can infer their effect on preferred taxes, donations, and the level of benefits households-in-need receive. Preferred tax rates increase in inequity aversion but decrease in warm glow. Donation rates increase in warm glow, but as an individual's donations do not contribute to reducing inequity, inequity aversion does not affect optimal donation rates—consequently, total benefits for the poor increase in both dimensions. However, let's compare it with the scenario where donations are not allowed. We can see that for regions with somewhat high inequity aversion and warm glow, total benefits would decrease by allowing donations in society. So depending on the preferences representing social values, allowing donations might or might not benefit those that they are designed to target, even if donation expectations are correct, as a consequence of the equilibrium brought by the taxes set by the politician.

Figure 1: Benefit accruing to each zero-income household with versus without donations in the RERA benchmark for different levels of generosity and warm glow



Notes: authors' calculations based on solving the problem of the representative agent with rational expectations and correct beliefs about the level of average donations in society. Tax rates are constrained from below at $\underline{\tau} = 0.2$ representing a mandatory minimum level of taxation covering other government expenditures, and household income is set at \$60,000.

2.3.2 General case

We now move away from the representative agent, rational expectations benchmark; that is, we allow for heterogeneous household-level utility parameters and income and household-specific expectations. We treat these as model parameters without imposing any assumption and derive the optimal level of donations again for an employed household i in this general case. Analogously to the RERA case, households maximize their utility with respect to the

donation level d_i:

$$
\begin{aligned}
V(w_i, W, d_{-i}, \tau, N_z, N_p) = \max_{d_i} & \, log(c_i) + \gamma_i log(1 + d_i) \\
& + \alpha_i log\Big(\frac{1}{N_z}\big((\tau - \underline{\tau})W + N_p \mathbb{E}[d_{-i}|\tau]\big)\Big) \\
& + \eta_i \Bigg(\mathbb{1}\big[d_i \geq \mathbb{E}[d_{-i}|\tau]\big] \cdot log(1 + (d_i - \mathbb{E}[d_{-i}|\tau])^2) \\
& - \mathbb{1}\big[d_i < \mathbb{E}[d_{-i}|\tau]\big] \cdot log\big(1 + (\mathbb{E}[d_{-i}|\tau] - d_i)^2\big) \Bigg),
\end{aligned}
$$

resulting in the following first-order condition for the optimal level of donations:

$$
\text{w.r.t. } d_i : \frac{1}{w_i(1-\tau) - d_i} = \frac{\gamma_i}{1 + d_i} + \frac{2\eta_i(d_i - \mathbb{E}[d_{-i}|\tau])}{1 + (d_i - \mathbb{E}[d_{-i}|\tau])^2} \tag{6}
$$

from which the optimal level of donations can be retrieved as the solution to the third-degree equation:

$$
\begin{aligned}
0 = & \Big(1 + \gamma_i + 2\eta_i\Big) d_i^3 \\
& + \Big(1 - 2\mathbb{E}[d_{-i}|\tau](1 + \gamma_i + \eta_i) - w_i(1-\tau)(\gamma_i + 2\eta_i)\Big) d_i^2 \\
& + \Big(1 - \gamma_i - 2\eta_i w_i(1-\tau) + \mathbb{E}^2[d_{-i}|\tau] + 2\mathbb{E}[d_{-i}|\tau]\big(1 - \eta_i + (\eta_i + \gamma_i) w_i(1-\tau)\big)\Big) d_i \\
& + \Big(1 - \gamma_i w_i(1-\tau) + 2\eta_i w_i(1-\tau)\mathbb{E}[d_{-i}|\tau] + \mathbb{E}^2[d_{-i}|\tau](1 - \gamma_i w_i(1-\tau))\Big)
\end{aligned}
$$

This model setup constitutes the baseline for the hypothetical scenarios we use in our survey. In the survey, we ask respondents to choose their amount of donations conditional on different levels of income (w_i) and taxes (τ), along with the expected value of donations in society given the level of taxes $\mathbb{E}[d_{-i}|\tau]$. Furthermore, we also elicit respondents' preferred level of taxes for two types of society: one where donations are allowed and one where taxation is the only source of support for the households in need. This approach enables us to predict the effect of donations on the equilibrium level of taxes and the welfare of the households in need.

3 Survey experiment

To investigate the causal relationship between donations, taxation, and poverty, we implement a survey experiment in the spirit of the model detailed earlier. The data are provided by a sample of 380 U.S. adult residents selected through the professional survey company Prolific[9] to represent the population at large in terms of age, gender, and ethnicity. The survey requires approximately 40 minutes to complete and asks respondents to go through three main sections. The full text of the questionnaire is available upon request.

To provide context for the survey, we first present some aggregate descriptive evidence for the United States regarding the interrelatedness of charity, local taxation, and poverty at the county level. Table 1 and Figure 2 show donation rates, property taxes, and poverty rates as relevant proxy measures of these concepts with meaningful variance at the county level.[10] On average, people donate nearly 1.8% of their adjusted gross income, pay approximately 9.7 dollars on a thousand dollars worth of real estate, while the county-level average poverty rate is slightly below 16%. We can see a substantial geographic variation in the country. A look at pairwise correlations reveals that donations are negatively associated with local property taxes (-0.19) and positively with the poverty rate (0.07), while poverty correlates negatively to tax rates (-0.33).

[9] www.prolific.co.

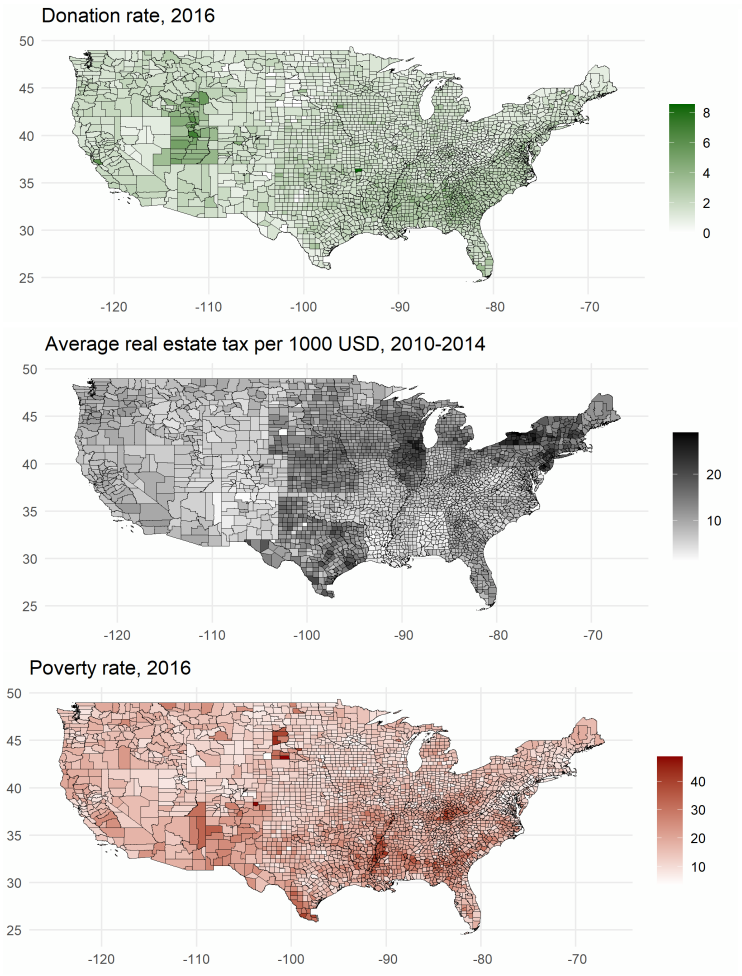
[10] We measure donation rates at the county level as the total charitable contributions reported in tax filings divided by the total adjusted gross income estimated by the Statistics of Income division, available at the Internal Revenue Service website: https://www.irs.gov/statistics/soi-tax-stats-county-data-2016, accessed 18/05/2021. For local taxation, we employ the five-year average (for 2010-2014) of the property taxes per $1000 worth of real estate collected by the National Association of Home Builders available at: https://www.nahbclassic.org/generic.aspx?genericContentID=250239&fromGSA=1, accessed 27/04/2021. Finally, poverty rates are based on the Annual Social and Economic Supplements of the 2016 Current Population Survey (CPS ASEC). Available at: https://www.census.gov/library/publications/2017/demo/p60-259.html, accessed 10/08/2021.

Table 1: Descriptive statistics of the key variables

	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Donation rate in 2016	3,129	1.816	0.802	0.000	1.275	2.193	8.552
Property taxes 2010-2014	3,129	9.700	4.635	1.085	6.124	12.503	29.001
Poverty rate in 2016	3,129	15.864	6.263	3.400	11.400	19.100	48.600

Note: The table reports the descriptive statistics for the main variables of the analysis dataset, which is collected by the authors from the following sources. Charitable tax deductions of 2016 are accessed via the website of the Internal Revenue Service, maintained by the Statistics of Income division. Data on property taxes from 2010-2014 are collected by the National Association of Home Builders. Poverty rates are calculated based on the CPS ASEC data by the U.S. Census Bureau.

Figure 2: The geographic variation in the key variables



Note: Figure shows the authors' calculations based on the following publicly available datasets. The donation rate for 2016 is calculated as donations over adjusted gross income. The data are accessed via the website of the Internal Revenue Service, maintained by the Statistics of Income division. Data on property taxes from 2010-2014 are collected by the National Association of Home Builders. Poverty rates are calculated based on the CPS ASEC data by the U.S. Census Bureau. Alaska and Hawaii are omitted from the map but are part of the dataset.

In order to shed light on the causal mechanisms behind these relationships, we ask respondents to imagine their preferences on taxation and their expectations and behavior concerning donations in six hypothetical scenarios. This first section of the survey replicates the game's structure presented in Section 2. In each scenario, respondents are asked to take up the roles of employed, income-earning households and to indicate their preferred contribution to the welfare of zero-income households (described as 'households in need'), which

account for 15% of the overall population. In three out of six scenarios, respondents can contribute to the welfare of the households in need through additional taxation collected for that purpose or through private donations (complete scenarios). In addition to their own behavior and preferences, they are also asked to state how much they expect other employed households to donate. In the remaining three scenarios, individuals can only contribute through additional taxation, while donations are not allowed (no-charity scenarios). Within each category (with and without charity), scenarios differ according to the level of income accruing to the respondent's household: low, middle, or high.

The last two sections of the survey respectively ask for demographic information such as gender, age, ethnicity, state of birth, education level, occupation, income category and religion, and respondents' real-life charitable behavior (volunteering experiences and private donations) and elicit political preferences, personal attitudes towards economic redistribution and charitability, time- and risk-related preferences.

3.1 Descriptive statistics of the survey sample

Consistently with the 2019 American Community Survey estimates[11], our sample contains slightly more female than male respondents (51%) and is predominantly white (69%). Concerning age, the most represented category is the 58+ constituting 30% of the respondents, while the remaining categories all contain between 16 and 19% of the sample. Moving on to variables not targeted by the representative sample requirements, high-income households (that we defined as reporting a gross income of more than $90,000, consistently with the hypothetical scenarios of the first section of the survey) are over-represented in the sample, 40% versus 31% in the U.S. population.[12] The fraction of middle-income households (reporting a gross income of between $50,000 and $90,000) is slightly under-estimated, representing 27% of our sample but 30% of the overall population. Finally, low-income individuals (reporting a gross income below $50,000) represent 33% of our sample versus 38% of the U.S. population.

Hence, unsurprisingly, the sample has a low fraction of individuals with less than a high school diploma and high school graduates (0.3% and 7.9% versus 10% and 28% in the overall

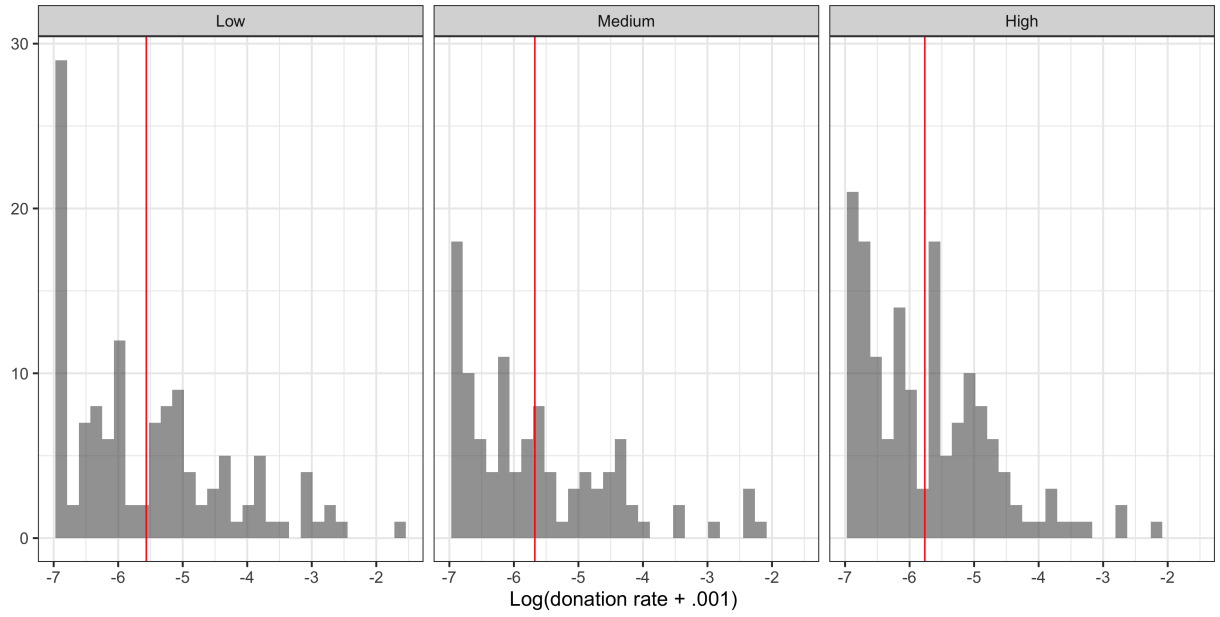
[11] Aggregate demographic information is available at: https://data.census.gov.

[12] Data on income brackets available at: https://censusreporter.org/topics/income/.

population). At the same time, more than 30% of respondents hold a master's or professional degree, versus 10.2% in the population at large. Concerning religion, more than 30% of the sample declared having no religious identity. Among those indicating some religious affiliation, the most prevalent creed is Catholicism (26% of the sample), followed by other Christian denominations (18%) and mainline Protestantism (11%).

Finally, concerning the reported patterns of charitable behavior, slightly less than 30% of the respondents report no experience with volunteering, and less than 15% have never engaged in monetary donations. More than half of the respondents volunteer occasionally and report having donated a few times. A sizable fraction (21% of the respondents) reports engaging in regular donations. The following graphs show the distribution of estimated yearly donations by income category. Although respondents from the lowest income category are more likely not to donate, the average donation rate slightly decreases with income.

Figure 3: Estimated in-life donation rate by income category



Note: We estimate donation rates in real life by combining survey responses on the frequency of donations and the average donation size. To compute total donations, we impute the middle value of the donation brackets available in the survey and multiply it by the reported number of yearly donations. To compute yearly income, we impute the middle value of the selected income bracket.

Table 2: Demographic characteristics of the sample

Category		Count	Fraction
Gender	Female	194	51%
	Male	186	49%
Age category	18-27	72	19%
	28-37	70	18%
	38-47	61	16%
	48-57	64	17%
	58+	113	30%
Ethnicity	White	264	69%
	Black	55	14%
	Other	61	16%
Education level	Less than high school degree	1	0%
	High school graduate	30	8%
	Some college but no degree	74	19%
	Bachelor or associate degree in college	130	37%
	Master's or professional degree	121	32%
	Doctoral degree	14	4%
Income category	Low income ($< \$50k$)	125	33%
	Middle income ($50k-$90k)	102	27%
	High income ($> \$90k$)	153	40%
Religion	No religious identity	120	32%
	Roman Catholic	96	26%
	Protestant (mainline)	41	11%
	Evangelical Protestant	21	6%
	Other Christian religion	68	18%
	Other non-Christian religion	34	9%
Frequency of volunteering	Never	105	28%
	Occasionally	202	53%
	At least once per month	46	12%
	At least once per week	27	7%
Frequency of donations	Never	56	15%
	Once	44	12%
	A few times	199	52%
	Regular donations	81	21%

3.2 Preferences and predicted behaviors in hypothetical scenarios

To analyze the effect of charity on economic redistribution, we analyze survey responses to the six hypothetical scenarios in the first section, where respondents are asked to report as truthfully as possible how much they would donate, what their preferred tax rate would be,

and how much they would expect others to donate. The main components of each scenario are summarized in the table below.

Table 3: Scenarios description

Common elements						
Fraction of households-in-need	15%					
Baseline tax rate	20%					
Additional tax rate to support households-in-need	0%, 2.5%, 5%, 7.5%, 10%					
Elements differing across scenarios						
Donations allowed	Yes	Yes	Yes	No	No	No
Gross income	\$40k	\$60k	\$120k	\$40k	\$60k	\$120k
Tasks for respondents						
Choosing preferred additional tax rate	Yes	Yes	Yes	Yes	Yes	Yes
Selecting own donations	Yes	Yes	Yes	No	No	No
Declaring expected donation of the typical household	Yes	Yes	Yes	No	No	No

As shown in Table 3, respondents perform between one and three tasks in each scenario. First, for scenarios where charity is allowed, respondents are asked to select the dollar amount that they expect the typical middle-income household (where the middle income is set at \$60,000) to donate for each level of additional tax rate.[13] Secondly, in these scenarios, respondents are asked to state how much they would be willing to donate to support households in need, given each of the five levels of additional tax rates.[14] finally, they are asked to assign preference points across these five levels of additional tax rates (the table reports the options between 0% and 10%). Their preferred tax rate is then computed as a weighted average of their preferences. Afterward, they similarly provide taxation preferences for scenarios without donations available.

When facing these questions, respondents are explicitly reminded of the amount of benefits households-in-need would receive and the net income their own household would end up with, conditional on each tax level and their previous answers about donation expectations in society. For instance, we use built-in survey tools to calculate the implication of a tax level choice on total unemployment benefits, given the respondent's own expectations elicited earlier. This ensures that respondents do not need to engage in complicated calculation

[13] In all the described scenarios, respondents are reminded that tax rates are flat and that donations cannot be deducted from their taxable income (i.e., they are subtracted from their net income).

[14] Dollar amounts are selected on a slider between a minimum of \$0 and a maximum of \$6,000.

exercises and can express their preferences in a self-consistent manner.

4 Results

This section presents the main results obtained from the survey analysis. We first measure the extent of the substitution between taxes and donations in both directions (namely, the effect of taxes on preferred donations and the availability of charity on preferred taxes), and then we rationalize these results by retrieving the respondents' structure of preferences. To do so, we estimate the three main utility parameters of the model (generosity, warm glow, and weight of reputational concerns) for each respondent and present aggregate statistics for the whole sample.

4.1 First direction of crowding out: taxes on donations

Our first result is that taxes do crowd out donations in our setting, but to a very limited extent. By regressing donations and donation rates on in-survey income and tax rate, and including individual fixed effects, we obtain that a 1% increase in tax rates results in a 0.058% decrease in donation rates (column 1 of Table 4), implying a crowding out the magnitude of less than 6%. This result is very far from the 100% rate implied by the full crowding out hypothesis, suggesting that individuals are not only interested in the total amount of public good (pure altruism) but also in the extent of their own contribution (*warm glow*).

Table 4: In-survey donations, donation rate, and expected donation rate on tax rates and income

	Donations (in $ 1000)	Donation rate (%)	Expected donation rate (%)
Income (in $1000)	0.011***	-0.021***	
	(0.001)	(0.002)	
Tax rate (%)	-0.048***	-0.058***	-0.076***
	(0.011)	(0.018)	(0.028)
Observations	5,700	5,700	1,900
R^2	0.536	0.505	0.498

Notes: Respondent-level fixed effects are included. Standard errors are clustered at the respondent level. *p<0.1; **p<0.05; ***p<0.01

The last column of Table 4 reports the result of an analogous regression, but with expected donation rates as the outcome variable (which, differently from own donations, are independent of income). The coefficient of the explanatory variable (in-survey tax rates) is negative and significant, but its magnitude is larger (by almost 2% in absolute terms) than for one's own donation rates. This discrepancy suggests that respondents' beliefs might be inaccurate, which we will now test more formally.

4.2 Correct beliefs

We now test whether respondents hold correct beliefs about the average level of donations in the hypothetical society described in the survey. Since we do not provide information on the income distribution in the society, but only a measure of central tendency[15], we aggregate actual donations by levels of income by using several sets of weights. For the primary analysis, we use the prevalence of low, middle, and high-income households[16] in the actual U.S. population, based on the 2019 version of the American Community Survey[17], but results are robust to using equal income weights, as well as to considering middle-income households only or to excluding middle-income households and considering equal weights for the remaining two categories. Figure 4 shows the distribution of the average difference between expected and realized donations for each level of the additional tax rate (0% to 10%). Standard errors are bootstrapped. Table 5 also reports the p value for the paired t-test for the difference in means, which leads us to reject the null hypothesis of accurate beliefs for all levels of taxes. Despite the difference between expected and actual donations being consistently positive and significant (implying overestimation of others' donations), the magnitude is larger for more extreme tax rates (on average \$420 versus \$310), suggesting that individuals tend to form better predictions in more realistic or preferable situations.

[15] Respondents are told that the typical income in society is \$60,000

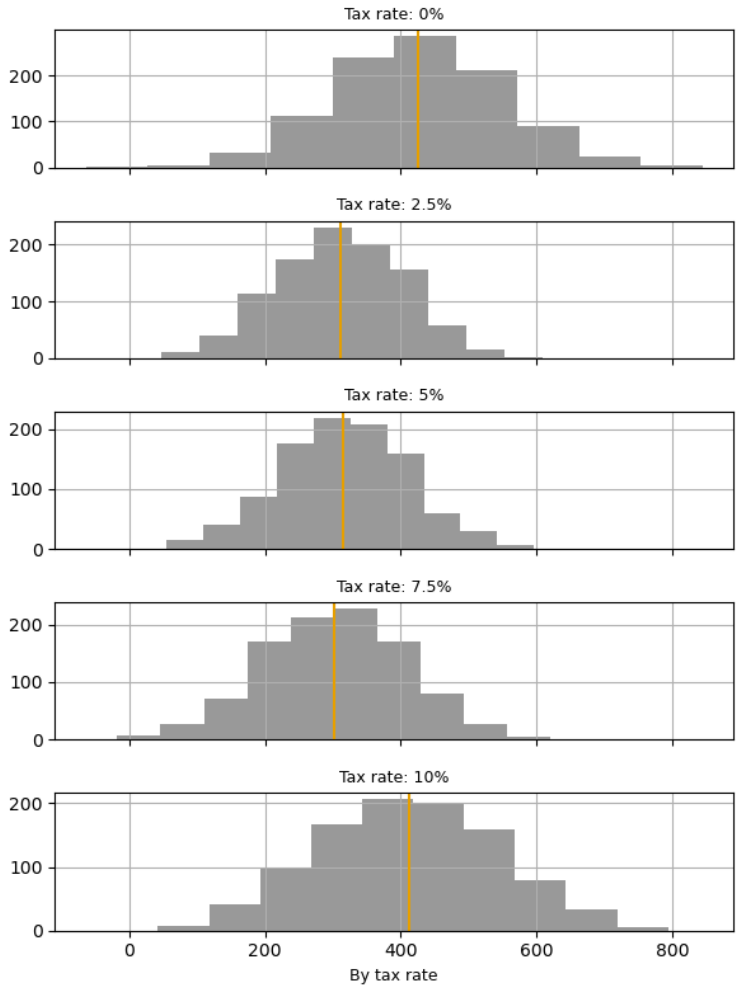
[16] Low income is defined as less than \$50,000, middle income as between \$50,000 and \$90,000 and high income as more than \$90,000

[17] Available at: https://censusreporter.org/topics/income/.

Table 5: Differences in expected and realized donations, and testing for accurate beliefs

Tax rate	Donations			
	Expected (in 1000 $)	Realized (in 1000 $)	Difference (in 1000 $)	Paired t-test p-value
0%	2.618	2.191	0.427	0.00
2.5%	2.299	1.987	0.313	0.00
5%	2.173	1.862	0.312	0.00
7.5%	2.070	1.759	0.311	0.00
10%	2.161	1.741	0.421	0.00

Figure 4: Distribution of the difference between expected and realized donations



Distribution of the bootstrapped difference between expected and realized donations. Income weights are 0.38, 0.30, 0.32

4.3 Second direction of crowding out

We next estimate the effect of the availability of donations on preferred tax rates, representing the second direction of crowding out. As all respondents are asked to state their preferences for all three imagined levels of household income, with and without donations available, we can interpret the estimates causally within the survey game's setup. Figure 5 shows the distribution of preferred tax rates for the two main scenarios (with versus without charity) and each level of in-survey income. Answers concentrate around 5%, especially for middle and higher income levels, while maximal levels appear more frequent with higher income and minimal levels with lower incomes. As expected, Table 6 reveals that respondents tend to prefer lower additional tax rates when donations are allowed: compared to the baseline of around 4.53% ideal tax rate for low-income households, donations decrease ideal taxes by 0.74% on average, while higher in-game income results in higher preferred tax rates. The availability of donations does not interact with the in-game income levels on average for the entire sample, so the effect of income on the ideal tax rate seems to be independent of donation availability.

Figure 5: Ideal tax rate with and without donations

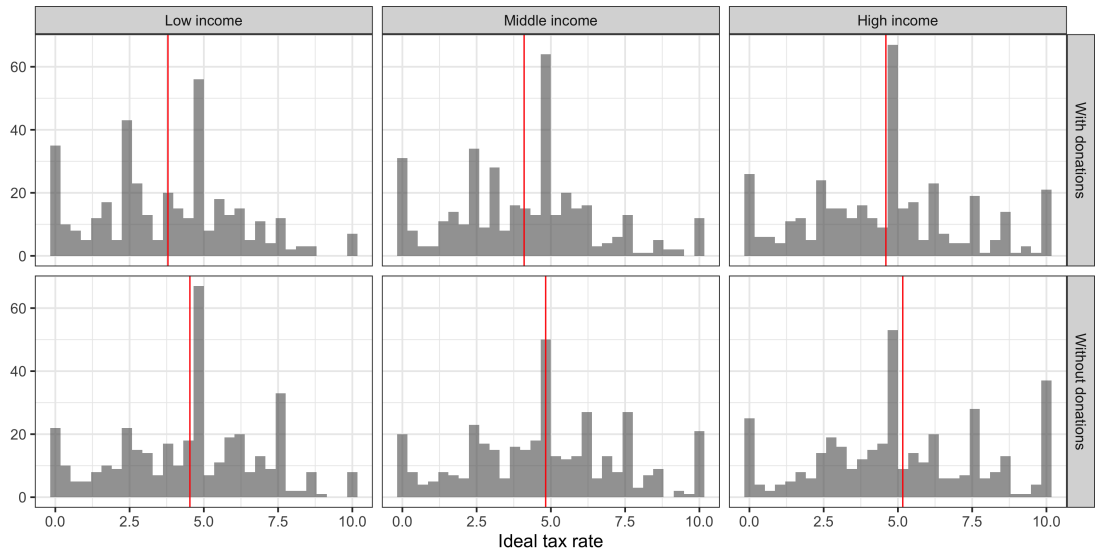


Table 6: Ideal tax rates regressed against in-game income and donation availability

	Ideal tax rate
Middle income (60k)	0.294**
	(0.093)
High income (120k)	0.632***
	(0.106)
Donations allowed	-0.739***
	(0.129)
Middle income (60k) X Donations allowed	0.013
	(0.127)
High income (120k) X Donations allowed	0.170
	(0.135)
Observations	2280
R^2	0.672

Notes: Respondent-level fixed effects are included. Standard errors are clustered at the respondent level. *p<0.1; **p<0.05; ***p<0.01

Despite the usefulness of these individual-level results, which already point to some crowding out of donations on preferred public support for zero-income households, we are ultimately interested in the equilibrium tax rate at the societal level. Therefore, based on our model, we aggregate individual preferences by solving the neutral government's problem, which results in selecting the preferred tax rate of the median voter.

We rely on bootstrapping to simulate our hypothetical society repeatedly, where the bootstrapped preferences of survey respondents account for 85% of the votes (i.e., the proportion of positive-income households in society) while the remaining 15% of the votes are for the highest available additional tax rate(10%) since zero-income households optimize their utility by maximizing public support.

Table 7: Average realizations of the outcomes of interest

Variable	Private charity	Mean	SD
τ_a^{med} (%)	No	5.249	0.160
Benefit (in 1000 $)	No	21.167	0.646
τ_a^{med} (%)	Yes	4.848	0.110
Benefit (in 1000 $)	Yes	30.170	$0.608
Average donation rate (%)	Yes	2.966	0.103
Average donation (in 1000 $)	Yes	1.874	0.006
Average expected donation (in 1000 $)	Yes	2.183	0.007

Table 8: Average difference in the outcomes of interest

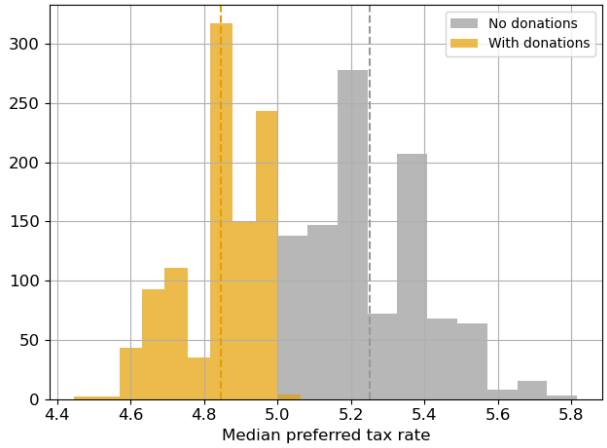
Difference	Mean	SD
τ_a^{med} (%)	-0.401	0.156
Benefit (in 1000 $)	9.003	0.747

The resulting distribution of the equilibrium tax rate in the two main cases (with and without charity) and of the benefit accruing to each poor household are reported in figure 6, alongside the distribution of the difference in the two outcomes of interest. The average values and bootstrapped standard deviations are reported in table 7, while table 8 reports the average difference in equilibrium tax rate and benefit. The equilibrium tax rate is 5.25% in the taxation-only case compared to 4.85% when donations are allowed. Private donations (on average $1,874 per positive-income household) more than compensate for the loss in public support, resulting in a much higher benefit per zero-income household in the case with charity ($30,000 versus $21,000)[18].

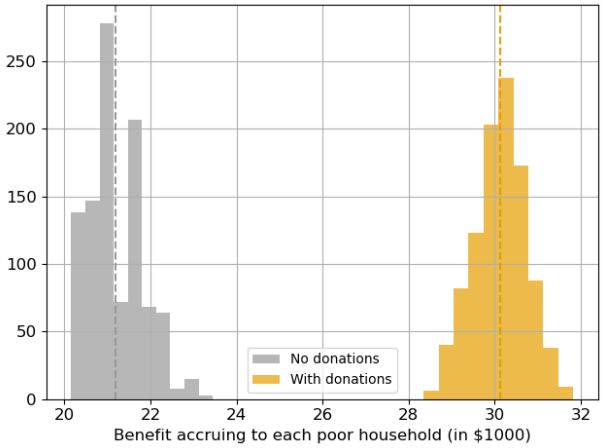
[18]To retrieve the average level of donations in the case with charity available we consider the preferred donation of each respondent for the two discrete levels of tax rate which are closest to the equilibrium level, weighting each by its distance to the equilibrium level.

Figure 6: Equilibrium tax rates and benefits of the simulations

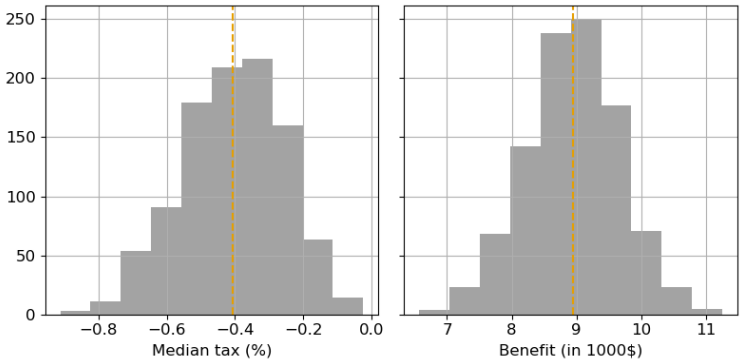
(a) Additional tax rate in equilibrium



(b) Poor household benefit in equilibrium



(c) Difference in equilibrium outcomes



4.4 Background characteristics and in-game behavior

Four key in-game behavioral variables (donation rates, expectations about donation rates, the difference between the two, and preferred tax levels) determine the simulation results, for which we can examine partial correlations with respect to other relevant background characteristics. For each respondent, we average through the values of each in-game variable across scenarios and then regress them on a set of respondent-level characteristics including demographic information, attitudes towards inequity and fairness, the preferred size of unemployment benefits, and psychological factors (risk-aversion and patience as in Falk et al.,

2016), along with self-reported real-life charitable behavior[19].

Table 9 presents the OLS estimates of these regressions[20]. Reassuringly, the average in-game donation rates are close to the aggregates we observe in the county-level data. As we already noted, the expectations of survey participants about the average donation rates do not match the realized average, as people overestimate how much others would donate by around 0.8 percentage points (23%). As a baseline falsification exercise, the positive relationship between real-life and in-game donation rates and the negative relationship between conservativism and preferred tax levels provide evidence of consistency between the survey respondents' in-game behavior and their in-life attributes.

In-game donation rates and expected donation rates tend to be significantly lower for women in our sample. Conservativism is associated negatively with donation rates and the preferred level of taxes. In contrast, respondents who score higher on inequity aversion or prefer higher unemployment benefits also donate less in the game on average but have higher ideal tax rates, and more inequity-averse individuals also expect others to donate less. Real-life volunteering correlates negatively with in-game own and expected donations, suggesting that donations and volunteering are seen as substitutes. Additionally, respondents who are more risk-loving and who score higher on the in-game checkpoint tests (showing a more accurate understanding of the survey game) tend to donate less and have lower expectations concerning others' donations. While highly educated respondents seem to donate less than what they expect others to do, married or cohabiting respondents tend to do the opposite.

Finally, religion also seems to play a role concerning in-game behavior. Protestant self-identification does not seem to correlate strongly with either in-game donations or ideal tax rates, but Protestants expect others to donate significantly less, ending up donating significantly more than what they expect from others. Living in a predominantly Protestant area does not correlate with such factors; however, it is negatively associated with preferred taxes, showing the still-present importance of majority religion on local social and communal norms, corroborating seventeenth-century evidence (Pugh, 1980).

[19]For the variable groups of inequity attitudes and unemployment benefits we construct principal components due to their high cross-correlation, and we include those in the regressions.

[20]The means and standard deviations for the outcome variables are reported at the bottom of the table

Table 9: In-survey behavior outcomes and participant background

	Dependent variable:			
	Donation rate	Expected donation rate	Preferred taxes	Donation difference
	(1)	(2)	(3)	(4)
Tertiary educated	−0.234	0.377	−0.146	−0.538**
	(0.235)	(0.275)	(0.265)	(0.268)
Female	−0.416**	−0.487**	−0.370	0.038
	(0.209)	(0.245)	(0.235)	(0.238)
Age 28-37	−0.723**	−0.969**	−0.780*	−0.065
	(0.356)	(0.416)	(0.400)	(0.405)
Age 38-47	0.102	−0.306	−0.284	−0.048
	(0.390)	(0.456)	(0.439)	(0.444)
Age 48-57	−0.262	0.121	−0.466	−0.735
	(0.393)	(0.459)	(0.442)	(0.447)
Age 58+	−0.622*	−0.548	−0.530	−0.414
	(0.351)	(0.410)	(0.394)	(0.399)
Black	0.271	0.413	−0.517	−0.265
	(0.309)	(0.361)	(0.347)	(0.352)
Asian	−0.374	0.773*	−0.769*	−1.381***
	(0.361)	(0.422)	(0.406)	(0.411)
Hispanic	0.423	0.434	0.115	0.047
	(0.432)	(0.505)	(0.486)	(0.492)
Other	−0.035	−0.859**	−0.158	0.840**
	(0.348)	(0.407)	(0.392)	(0.397)
Majority religion is Protestant	−0.226	0.057	−0.595**	−0.342
	(0.236)	(0.275)	(0.265)	(0.268)
Own religion is Protestant	−0.014	−0.637*	−0.047	0.654**
	(0.290)	(0.340)	(0.327)	(0.331)
Goes to church at least monthly	0.121	0.266	0.226	−0.145
	(0.226)	(0.264)	(0.254)	(0.258)
Conservative scale	−0.128**	−0.073	−0.177***	−0.042
	(0.054)	(0.063)	(0.060)	(0.061)
log(real life donation rate+0.001)	0.199***	0.100	0.119	0.104
	(0.072)	(0.084)	(0.081)	(0.082)
Real life donation rate is 0	0.466	0.640	0.174	−0.400
	(0.466)	(0.544)	(0.524)	(0.530)
Real life regular volunteering	−0.475**	−0.525**	−0.015	−0.102
	(0.207)	(0.243)	(0.233)	(0.236)
Inequity aversion / fairness princ. comp.	−0.377***	−0.210**	0.155*	−0.106
	(0.080)	(0.094)	(0.090)	(0.091)
Unemployment benefit princ. comp.	0.193***	0.034	0.149**	0.206***
	(0.064)	(0.075)	(0.072)	(0.073)
Number of right answers	−0.411***	−0.483***	−0.019	0.117
	(0.120)	(0.140)	(0.135)	(0.137)
Forward-looking preferences	−0.067	−0.036	0.076	−0.013
	(0.048)	(0.056)	(0.054)	(0.055)
Risk-loving preferences	−0.106**	−0.092*	−0.047	−0.001
	(0.043)	(0.050)	(0.048)	(0.049)
Married or cohabiting	0.120	−0.441	−0.122	0.677**
	(0.251)	(0.294)	(0.282)	(0.286)
Number of children	0.104	0.235**	0.054	−0.106
	(0.098)	(0.115)	(0.110)	(0.112)
Constant	4.976***	4.581**	5.712***	1.018
	(1.558)	(1.822)	(1.753)	(1.775)
Observations	380	380	380	380
R^2	0.339	0.253	0.161	0.173
Mean of outcome	2.874	3.627	4.501	−0.680
SD of outcome	2.062	2.268	2.059	2.101

Notes: The population size of the respondent's area of living, geographic divisions, and log of estimated real-life income are also included as independent variables in the regressions; we omitted them from the table to ease visibility. Standard errors are in parentheses. Donation difference is the difference between the individual's own donation rate vs. what they expect the aggregate donation rate to be.
*p<0.1; **p<0.05; ***p<0.01

4.5 Estimation of individual utility parameters

In order to better understand the structure of preferences leading to the observed results, we also estimate the individual utility parameters of our theoretical model, namely generosity (α), taste for donations (γ), and weight of reputational concerns (η). First, the value of generosity (α) is obtained by solving Equation 1 in the simpler scenario where private charity is not available, for each individual and each of the three possible wage levels. The three individual-level observations are then averaged out to retrieve the final estimate. Second, we identify the remaining individual-level parameters (γ and η) by minimizing the sum of squared deviations of observed in-game donations from the theoretical donations implied by solving the individual utility maximization problem[21].

Table 10 reports the main summary statistics for the estimated parameters, while Table 11 shows their estimated correlation. On average, generosity has a value of 6.6%, meaning that individuals assign to the utility of the poorest members of society a weight of 6.6 percentage points compared to the weight of their own utility from consumption. Estimates at the individual level range from a minimum value of 0 to a maximum value of 14.3 percentage points. Direct utility from donations, or *warm glow*, is estimated to be 2.8% of the utility from one's own consumption for the average respondent, with a minimum of 0 and a maximum of 8.4 percentage points in the whole sample. Finally, the weight of reputation, proxied by the deviation of own donations from the expected societal level, is on average 0.2 percentage points, ranging from a minimum of 0 to a maximum of 3.8%. From the correlation structure, we can conclude that people who derive more utility from donating also tend to be more generous towards the poor and less concerned about reputation, while reputation and generosity are not linearly related.

[21] The problem is solved for each level of income and tax rate available in the hypothetical scenarios. Additional details on the estimation procedure are presented in the Appendix.

Table 10: Summary statistics for the estimated utility parameters

	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
α	380	0.066	0.034	0.000	0.044	0.089	0.143
γ	380	0.028	0.019	0.000	0.012	0.042	0.084
η	380	0.002	0.004	0.000	0.000	0.002	0.038

Notes: The table reports descriptive statistics of the utility parameters, estimated using simulated estimated correlations of the utility parameters based on the model. *p<0.1; **p<0.05; ***p<0.01.

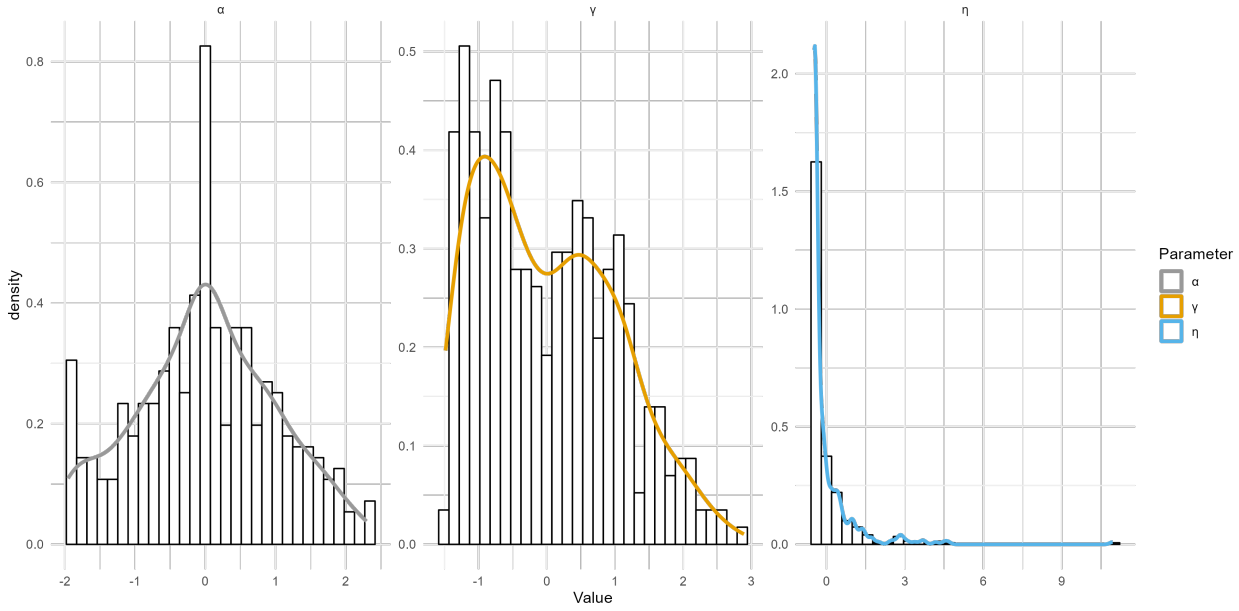
Table 11: Correlation structure of the utility parameters

	α	γ	η
α	1.00		
γ	0.16***	1.00	
η	0.07	-0.29***	1.00

Notes: The table reports the estimated correlations of the utility parameters based on the model. *p<0.1; **p<0.05; ***p<0.01.

Finally, figure 7 displays the distribution of the standardized parameters for the entire sample. Generosity follows a unimodal shape, with the majority of the sample being centered around the mean within two standard deviations, with the exception of some bunching around the minimum for those who do not derive utility from the welfare of the poor. In contrast, the shape of the warm glow parameter distribution suggests the presence of two different groups, one centered at approximately one standard deviation below the mean, and another one standard deviation above the mean. Finally, the weight of reputational concerns is very close to zero for the vast majority of the sample, with a longer tail, suggesting the existence of a specific subset of respondents that care highly about social expectations, in contrast with the majority of the respondents for which this aspect seems to be not relevant.

Figure 7: Societal distribution of utility parameters



Notes: The figure displays the histograms and the estimated kernel densities of the standardized utility parameters estimated using the game structure and the survey sample.

Finally, Table 12 reports the partial associations of the estimated individual-level utility parameters and the background information of the respondents. These findings bridge the gap between the model and real-life observable characteristics and provide external support for the model conclusions. Demographics explain between 10% and 27% of the total variation in the values of the utility parameters. We find that the correlations regarding the generosity parameter (α) are intuitive: while conservatives are associated with significantly lower values, respondents scoring higher on inequity aversion are estimated to have higher values of the parameter. The warm glow utility parameter (γ) is associated with a range of factors. Positive associations include living in more highly populated areas and preferring higher unemployment benefits. While respondents seem to gain less utility from donations if they are older than twenty-eight, do real-life volunteering, score higher on inequity aversion or risk-loving, or have a better survey-game understanding in terms of correct test answers. The utility parameter capturing reputational concerns (η) is associated significantly at the 5% level only with being more patient or forward-looking in terms of preferences, while other demographic factors seem to have little influence.

Table 12: Utility parameters and participant background

	Dependent variable:		
	α	γ	η
	(1)	(2)	(3)
Lives in area of 2,500-50,000 pop.	0.330	0.678**	−0.289
	(0.285)	(0.266)	(0.295)
Lives in area of 50,000-1,000,000 pop.	0.442	0.515*	−0.164
	(0.283)	(0.264)	(0.293)
Lives in area of 1,000,000+ pop.	0.343	0.588**	−0.019
	(0.296)	(0.276)	(0.306)
Tertiary educated	−0.029	0.019	−0.261*
	(0.128)	(0.120)	(0.133)
Female	−0.106	−0.198*	−0.099
	(0.114)	(0.106)	(0.118)
Age 28-37	−0.365*	−0.480***	0.130
	(0.194)	(0.181)	(0.200)
Age 38-47	−0.154	−0.250	0.035
	(0.213)	(0.198)	(0.220)
Age 48-57	−0.201	−0.336*	0.064
	(0.214)	(0.200)	(0.221)
Age 58+	−0.253	−0.435**	0.037
	(0.191)	(0.178)	(0.197)
Black	0.030	0.112	0.083
	(0.240)	(0.224)	(0.248)
Asian	0.271	0.234	0.018
	(0.287)	(0.268)	(0.297)
Hispanic	0.319	0.029	0.482*
	(0.255)	(0.238)	(0.263)
Other	0.385*	0.074	0.227
	(0.197)	(0.184)	(0.203)
Majority religion is Protestant	−0.216*	−0.045	−0.027
	(0.128)	(0.120)	(0.133)
Own religion is Protestant	−0.025	0.045	0.215
	(0.158)	(0.148)	(0.164)
Goes to church at least monthly	0.101	0.135	−0.211*
	(0.123)	(0.115)	(0.127)
Conservative scale	−0.073**	−0.042	0.005
	(0.029)	(0.027)	(0.030)
log(real life donation rate+0.001)	0.051	0.067*	0.008
	(0.039)	(0.036)	(0.040)
Real life donation rate is 0	0.120	0.103	0.094
	(0.254)	(0.237)	(0.262)
Real life regular volunteering	0.047	−0.261**	0.161
	(0.113)	(0.106)	(0.117)
Inequity aversion / fairness princ. comp.	0.097**	−0.121***	−0.012
	(0.044)	(0.041)	(0.045)
Unemployment benefit princ. comp.	0.054	0.148***	−0.021
	(0.035)	(0.033)	(0.036)
Number of right answers	0.029	−0.121**	0.132*
	(0.065)	(0.061)	(0.068)
Forward-looking preferences	0.047*	−0.009	0.058**
	(0.026)	(0.024)	(0.027)
Risk-loving preferences	−0.008	−0.050**	0.034
	(0.023)	(0.022)	(0.024)
Observations	380	380	380
R^2	0.164	0.272	0.108

Notes: Dependent variables are standardized. Geographic divisions, the log of estimated real-life income, marital status, the number of children, and a constant are also included in the regression; we omitted them from the table to ease visibility. Standard errors are in parentheses.
*p<0.1; **p<0.05; ***p<0.01

5 Conclusion

Our results corroborate and extend several previous findings in the literature regarding the crowd-out between charity and the state, the drivers of charitable behavior, and individual behavior in public good games. By collecting and analyzing novel survey data, we provide evidence for the less-studied direction of charity crowding out the state in an abstract setting, connecting to the findings of Sav (2012), and Werfel (2018) amongst others. In our survey, we document that the other direction is also present: when taxes are higher, respondents choose to donate less. However, the relationship is not strictly monotonous for individual respondents or, on average. It suggests that even under the stylized and simplified conditions of our hypothetical scenarios, crowd-out might be only partial as people do not internalize the full effect of their choices on the public good provision, in line with the experimental findings of Eckel et al. (2005). We also find survey respondents to systematically overestimate the average donation rate in society compared to their realized average contribution, which might result in a sub-optimal public choice regarding poverty reduction. Our survey results are also in accord with aggregate evidence, suggesting a negative association of donations with poverty and taxes.

In our stylized setting, the higher equilibrium tax rates characterizing the no-donations scenario are not enough to compensate for the loss of private charity in terms of the benefit accruing to the poor. Retrieving the structure of preferences that generate the observed in-survey behavior, we confirm that individuals are not only interested in the welfare level of the poorest members of society but are also positively affected by the direct utility of contributing. This result corroborates the findings of Null (2011) that only a few donors are willing to pay to check whether their donations reach their declared target.

References

Andreoni, J. (1988). Privately Provided Public Goods in a Large Economy: The Limits of Altruism. *Journal of Public Economics*, 35:57–73.

Andreoni, J. (1990). Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving. *Economic Journal*, 100:464–77.

Andreoni, J. and Payne, A. A. (2013). Charitable Giving. In *Handbook of Public Economics*, volume 5, pages 1–50. Elsevier.

Becker, E. and Lindsay, C. M. (1994). Does the Government Free Ride? *The Journal of Law & Economics*, 37(1):277–296.

Becker, G. S. (1974). A Theory of Social Interactions. *Journal of Political Economy*, 82(6):1063–1093.

Bergstrom, T., Blume, L., and Varian, H. (1986). On the Private Provision of Public Goods. *Ted C Bergstrom*, 29.

Bredtmann, J. (2016). Does government spending crowd out voluntary labor and donations? *IZA World of Labor*.

Brooks, A. C. (2000). Is There a Dark Side to Government Support for Nonprofits? *Public Administration Review*, 60(3):211–218.

Bénabou, R. and Tirole, J. (2006). Incentives and Prosocial Behavior. *American Economic Review*, 96(5):1652–1678.

Charities Aid Foundation (2019). CAF World Giving Index 10th Edition: Ten years of giving trends. Technical report.

Duncan, B. (1999). Modeling charitable contributions of time and money. *Journal of Public Economics*, 72(2):213–242.

Eckel, C. C., Grossman, P. J., and Johnston, R. M. (2005). An experimental test of the crowding out hypothesis. *Journal of Public Economics*, 89(8):1543–1560.

Enke, B., Rodríguez-Padilla, R., and Zimmermann, F. (2020). Moral Universalism and the Structure of Ideology. Technical Report w27511, National Bureau of Economic Research.

Falk, A., Becker, A., Dohmen, T., Huffman, D., and Sunde, U. (2016). The Preference Survey Module: A Validated Instrument for Measuring Risk, Time, and Social Preferences. page 69.

Garrett, T. and Rhine, R. (2010). Government growth and private contributions to charity. *Public Choice*, 143(1/2):103–120.

Heutel, G. (2014). Crowding Out and Crowding In of Private Donations and Government Grants. *Public Finance Review*, 42(2):143–175.

Hoge, R. and Yang, F. (1994). Determinants of Religious Giving in American Denominations: Data from Two Nationwide Surveys. *Review of Religious Research*, 36(2):123.

Katz, E. and Rosenberg, J. (2005). An economic interpretation of institutional volunteering. *European Journal of Political Economy*, 21(2):429–443.

Null, C. (2011). Warm glow, information, and inefficient charitable giving. *Journal of Public Economics*, 95(5-6):455–465.

OECD (2021). Tax revenue (indicator). doi: 10.1787/d98b8cf5-en (Accessed on 28 May 2021).

Peloza, J. and Steel, P. (2005). The Price Elasticities of Charitable Contributions: A Meta-Analysis. *Journal of Public Policy & Marketing*, 24(2):260–272. Publisher: SAGE Publications Inc.

Pugh, W. J. (1980). Catholics, Protestants, and Testamentary Charity in Seventeenth-Century Lyon and Nimes. *French Historical Studies*, 11(4):479.

Pullan, B. (2005). Catholics, Protestants, and the Poor in Early Modern Europe. *The Journal of Interdisciplinary History*, 35(3):441–456.

Sav, G. T. (2012). Government free riding in the public provision of higher education: panel data estimates of possible crowding out. *Applied Economics*, 44(9):1133–1141.

Schiff, G. (1985). Does government spending crowd out charitable contributions? *National Tax Journal*, 38(4):535–546.

Simmons, W. and Emanuele, R. (2004). Does Government Spending Crowd Out Donations of Time and Money? *Public Finance Review*, 32:498–511.

van Elk, M., T. Rutjens, B., and van Harreveld, F. (2017). Why Are Protestants More Prosocial Than Catholics? A Comparative Study Among Orthodox Dutch Believers. *The International Journal for the Psychology of Religion*, 27(1):65–81.

Werfel, S. H. (2018). Does charitable giving crowd out support for government spending? *Economics Letters*, 171(C):83–86.

A Appendix

A.1 Additional survey results

Figure A1: Donation rate by additional tax rate and level of income

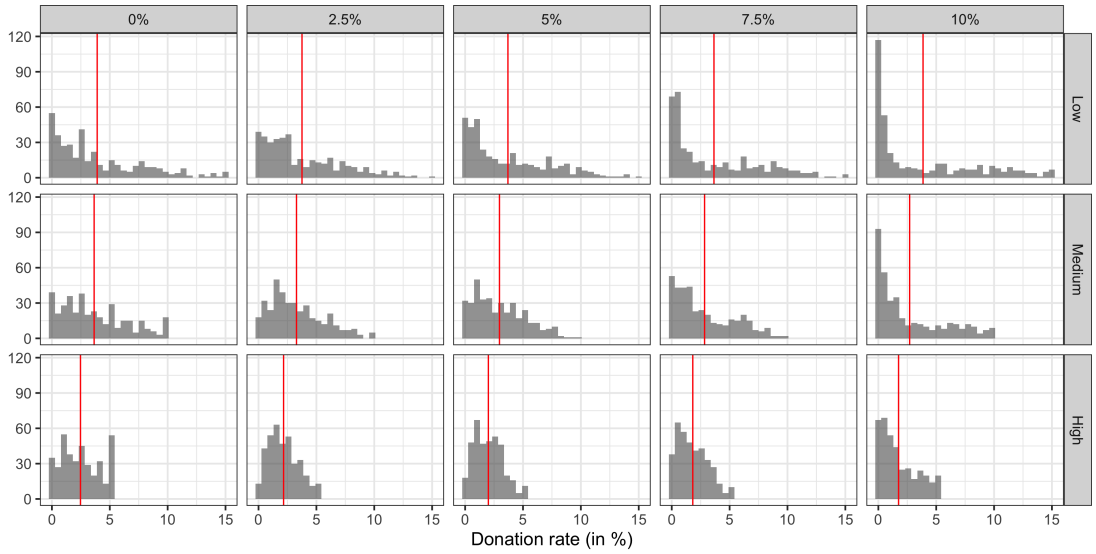
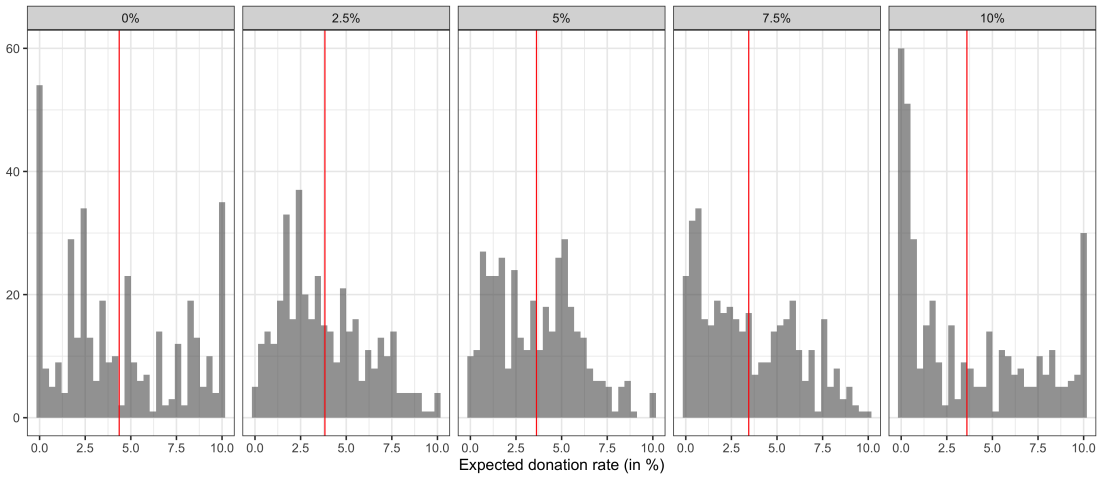


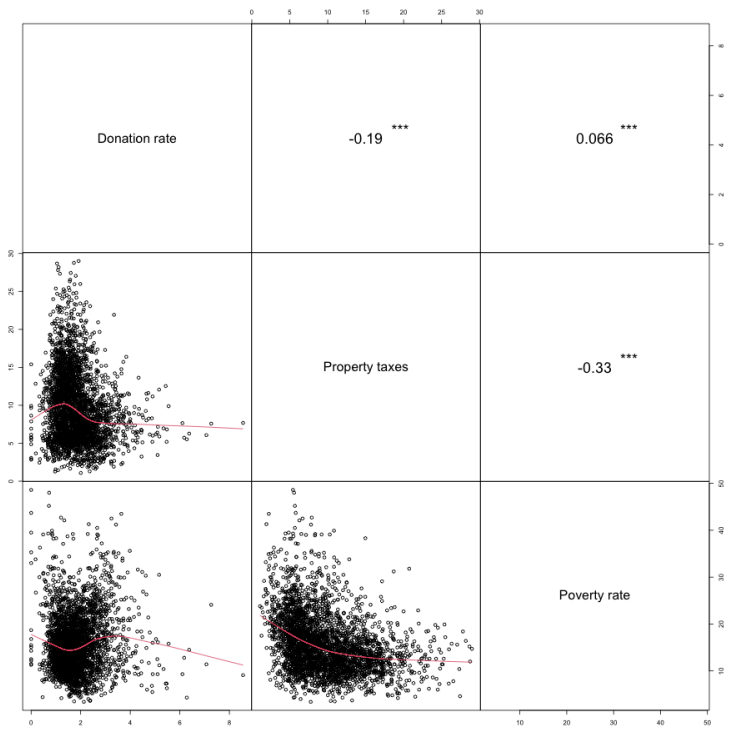
Figure A2: Expected donation rate by additional taxation level



A.2 Additional county-level descriptives

Figure A3 displays the pairwise correlations between the key variables relevant to the analysis on the county level.

Figure A3: Bivariate relations between the key variables



Note: Figure shows the bivariate relations of the county-level variables of the authors' calculations based on the following publicly available datasets. The donation rate for 2016 is calculated as donations over adjusted gross income. The data are accessed via the website of the Internal Revenue Service, maintained by the Statistics of Income division. Data on property taxes from 2010-2014 are collected by the National Association of Home Builders. Poverty rates are calculated based on the CPS ASEC data by the U.S. Census Bureau.

The causal links behind these correlations are unclear. Hence, as an additional exploratory step, we show regression results intended to provide a basic understanding before examining the question in more depth with our survey analysis. Indeed, regressions might not reveal causal links, as the actual mechanism could be driven by unobservable characteristics of the counties, such as different levels of inequity aversion or moral codes behind altruistic behavior (Enke et al., 2020), or by simultaneity as these variables are equilibrium outcomes.

In our first setup, we regress poverty rates on donation rates, property taxes, county-level characteristics, and state fixed effects. The first column of Table A1 reports the results of the simplest specification, where the poverty rate is regressed only on donation rate and property taxes. We can see that without additional covariates, there seems to be no statistically significant relationship between donations and poverty. At the same time, there

is a strong negative partial association between taxes and the poverty rate. Including state fixed effects (column 2) results in a negative partial correlation between the poverty rate and donations and taxes. Columns 3 to 6 include an increasingly comprehensive set of controls, with column 6 controlling for real GDP per capita, population size, and demographic composition according to religion[22], age group, ethnicity and educational level, and presidential election results. The additional covariates turn the relationship between taxes and poverty insignificant while preserving the sign and significance of the negative correlation with donation rates. Other controls improve the precision of the estimated donation rate coefficient (-0.8). If we were to interpret this estimate as causal, increasing donations by one standard deviation (0.8) would result in a relatively small decrease in the poverty rate of 0.64 percentage points, which is approximately 4% of the mean poverty rate and 10% of its standard deviation.

Table A1: County-level regression associations of poverty rate with property taxes and donation rates

	Dependent variable:					
	Poverty rate					
	(1)	(2)	(3)	(4)	(5)	(6)
Donation rate	0.034	−1.725***	−0.916*	−1.048**	−0.931***	−0.806***
	(0.691)	(0.406)	(0.508)	(0.493)	(0.244)	(0.250)
Property taxes	−0.448***	−0.232***	−0.092	−0.050	−0.023	−0.039
	(0.090)	(0.084)	(0.108)	(0.096)	(0.039)	(0.037)
State FE	No	Yes	Yes	Yes	Yes	Yes
GDP per capita, population size	No	No	Yes	Yes	Yes	Yes
Religious composition	No	No	No	Yes	Yes	Yes
Age, ethnicity, education composition	No	No	No	No	Yes	Yes
Election results	No	No	No	No	No	Yes
Observations	3,129	3,129	3,129	3,129	3,128	3,128
R^2	0.110	0.367	0.400	0.422	0.781	0.786

Note: *p<0.1; **p<0.05; ***p<0.01
Standard errors clustered at the state level in parentheses.

In our second setup (whose results are reported in Table A2), we take the local property tax as the outcome variable, and we examine its partial correlations with the two remaining key variables (donation rate and poverty rate). Here, even the coefficients' sign reacts substantially to the set of controls we include in the regressions. In the simplest specification,

[22]In Christianity, the role of charity is central, however, due to the different historical institutional evolution Protestants are expected to donate more than Roman Catholics (Pugh, 1980; Hoge and Yang, 1994; Pullan, 2005; van Elk et al., 2017).

which does not control for county characteristics nor state fixed effects, higher poverty rates and donation rates are associated with lower property taxes. Including state fixed effects reduces the coefficient on poverty rate by a magnitude and flips the sign on donation rates while accounting for most of the explained variance fraction of 0.78. The inclusion of demographic controls reverts the partial correlation between tax and donations to negative, while the impact of the poverty rate becomes non-significant. If we were to interpret the estimates causally, a standard deviation increase of donation rates would imply a slight decrease in local taxes of around 0.288 per 1000$ of property value, around 3% of the mean.

Table A2: County-level regression associations of property taxes with poverty and donation rates

	Dependent variable:					
	Property taxes					
	(1)	(2)	(3)	(4)	(5)	(6)
Donation rate	-0.960^{**}	0.518^{***}	-0.058	-0.101	-0.407^{***}	-0.360^{***}
	(0.374)	(0.149)	(0.116)	(0.120)	(0.102)	(0.099)
Poverty rate	-0.238^{***}	-0.045^{***}	-0.016	-0.009	-0.009	-0.016
	(0.051)	(0.015)	(0.019)	(0.017)	(0.015)	(0.014)
State FE	No	Yes	Yes	Yes	Yes	Yes
GDP per capita, population size	No	No	Yes	Yes	Yes	Yes
Religious composition	No	No	No	Yes	Yes	Yes
Age, ethnicity, education composition	No	No	No	No	Yes	Yes
Election results	No	No	No	No	No	Yes
Observations	3,129	3,129	3,129	3,129	3,128	3,128
R^2	0.138	0.778	0.814	0.816	0.837	0.839
Note:						*p<0.1; **p<0.05; ***p<0.01
						Standard errors clustered at the state level in parentheses.

The evidence we presented so far suggests that the inter-relatedness of poverty, charity, and taxation is challenging to clarify. According to these preliminary findings, higher donations seem to be associated with lower poverty and local property taxes, while the suggested magnitudes are relatively small. However, the sign and magnitude of these estimates are not robust to the inclusion of different controls, nor can we claim that they capture causal relationships.

A.3 Individual-level parameter estimation

A.3.1 Generosity parameter

The generosity parameter is obtained at the individual level by solving equation 1 for each individual and each level of wage in the scenarios when donations are not allowed:

$$\alpha_i(w_n) = \frac{\tau_i^*(w_n) - \underline{\tau}}{1 - \tau_i^*(w_n)}$$
$$\alpha_i^* = \frac{\sum_{n=1}^{3} \alpha_i(w_n)}{3}$$

A.3.2 Warm glow and reputation weight parameters

The remaining two parameters, measuring the weight of the direct utility from donations (γ_i) and of reputation (η_i), are estimated numerically via a non-linear optimization algorithm which minimizes the normalized sum of squared deviations of the observed in-survey donations from the theoretical solution of the utility maximization problem for each wage and tax rate level proposed in the hypothetical scenarios. For each individual i, (γ_i, η_i) is chosen to minimize the following expression given the levels of in-game taxation, income, and α_i, the previously estimated utility weight for generosity:

$$\min_{(\gamma_i,\eta_i)} \sum_{n=1}^{5} \sum_{m=1}^{3} \left(d_i(\tau_n, w_m) - d_i^*(\gamma_i, \eta_i; \alpha_i, \tau_n, w_m)\right)^2,$$

where $\tau_n \in \{0, 0.025, 0.05, 0.075, 0.1\}$ and $w_m \in \{40,000; 60,000; 120,000\}$.

While for each of the 380 respondents, we cannot show that the objective functions' minima were indeed reached, we can display in Figure A4 the average values of the objective function across respondents. We calculate them for a $\pm 10 \times 10\%$ neighborhood of the selected values for the two utility parameters. We can see that the γ and η values found indeed minimize the optimization problems on average.

Figure A4: Average value of the objective function in a neighborhood of the solution