Charitable Behavior and Public Intervention: a Survey Experiment*

Francesca Leombroni[1] and Bence Szabó[2]

[1]francesca.leombroni@phd.unibocconi.it

[2]bence.szabo@phd.unibocconi.it

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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 which are built starting from a simple model of public good contribution, in order 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. This means that, in our setting, private charity crowds out public intervention only to a limited extent, affecting equilibrium level taxes only slightly. Moreover, as equilibrium tax rates without donations are not high enough to compensate for the lack of private charity, our results suggest that people are less driven by inequity aversion than by the direct utility of donating (warm glow). As an implication, we conclude that in the United States the widespread availability of private charity plays a pivotal role in alleviating poverty, which government intervention cannot substitute for due to the structure of voters' preferences.

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

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1 Introduction

Charitable behavior plays an important role in nearly all societies. For instance, donations account for more than 2% of the United States GDP (Andreoni and Payne, 2013), and more than 40% of U.S. households are involved in volunteering activities (Charities Aid Foundation, 2019). Similarly to taxation, private charity is a form of contribution to the public good, and 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 lower poverty rates and a lower prevalence of charity.[2]

The relationship between charity and public good provision has been studied extensively in economics. Andreoni (2006) reviews the main contributions to this debate, mostly providing evidence in response to two broad questions: why private individuals voluntarily contribute to the public good (even in large communities where free riding would be expected to prevail), and to what extent it is optimal that either private donors or the government are directly in charge of subsidizing public goods. Traditional public good models (Becker, 1974; Bergstrom et al., 1986) predict a much larger prevalence of the free-riding phenomenon than the size of charitable contributions in real-world settings would suggest (Andreoni, 1988). More recent work has thus shifted from a purely altruistic framework (where individuals derive utility from private consumption and the total amount of public good in the society) towards the incorporation of impure altruism, namely the idea that individuals can derive positive utility from their own contribution (a "warm glow" effect as in Andreoni, 1990), the recognition of the role of reputational concerns and social norms (as in Bénabou and Tirole, 2006), or signalling in the labor market (Katz and Rosenberg, 2005). The existence of impure altruism and conformity to social norms has also been supported by experimental evidence from public

[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 (2021a), OECD (2021b), Charities Aid Foundation (2019).

good games (Ariely et al., 2009; Carpenter and Myers, 2010; DellaVigna et al., 2012).

Previous contributions on the degree of substitution between private charity and public intervention, and their optimal balance in the subsidization of public goods have investigated the government's complex, and ex ante ambiguous, effect on the supply of charity (Schiff, 1985; Duncan, 1999; Brooks, 2000; Simmons and Emanuele, 2004; Garrett and Rhine, 2010; Bredtmann, 2016). These works have mainly addressed one direction of causality, namely whether government intervention can hinder (or, on the contrary, facilitate through tax deductions[3]) private charity, and reached discordant answers, ranging from full crowding out to a near-zero effect. For instance, Eckel et al. (2005) highlight how crowding out of charity may be much lower in real world settings, as individuals do not fully internalize their own contribution to the government finances, and therefore indirectly to the public good, through taxation (fiscal illusion).

Less attention has been devoted to the opposite direction, that is, the effects of the supply of private charity on the role of the government. Becker and Lindsay (1994), Garrett and Rhine (2010) and Sav (2012) provide some evidence of the existence of crowding out in this direction for one particular sector, higher education. Heutel (2014) investigates whether private donations crowd out government grants to charities themselves, while Werfel (2018) finds evidence that individuals are less likely to support higher taxation when they are informed of the size of charitable contributions in the society.

Overall, we still lack an assessment of whether charitable behavior is actually beneficial to society, particularly in terms of poverty alleviation. Indeed, while the phenomenon of crowding out could simply result in a neutral redistribution of roles within society with no impact on the amount of public good provided, the strategic interplay between citizens and the state might lead to a change in the overall supply of the public good (in this case poverty alleviation).

In this paper we set out to document and disentangle the correlation between higher charity, lower size of the public sector and higher prevalence of poverty in the context of the United States, by providing survey experimental evidence of private charity crowding out

[3]See Peloza and Steel (2005) for a meta-analysis of the estimates of the price elasticity of individual donations in the literature.

public intervention, and examining its effect on the welfare of the poor. To put the question in context, we first collect and analyze aggregate data on donations, poverty rates, and property taxes at the county level for the United States. Controlling for state fixed effects, population size, real GDP per capita, political preferences, along with demographic and religious composition, we find that on average higher donation rates are associated with lower local property taxes and poverty rates, while given all other factors the partial correlation between the level of taxes and poverty rates is not statistically significant. However, the sign and magnitude of these associations depend greatly on which controls we include in the regressions, rendering any conclusions based on such an exercise questionable. Furthermore, since it is highly plausible that taxation, poverty and private charity are jointly determined, causal effects would be hard to disentangle. We therefore resort to a survey experiment to address endogeneity more convincingly.

We present a sample of 380 U.S. respondents[4] with hypothetical scenarios based on a public good game between two types of players, the government and the citizens. The game is structured such that the government chooses the level of taxation that maximizes the probability of re-election by matching the median voter's preferences. In the second stage, citizens choose their consumption and donations, depending on the level of taxation selected by the government. Based on this game, in the survey we exogenously 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 levels of taxation, and their expectations about the average level of donations in society. Based on their answers we simulate equilibrium outcomes in our public good game 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' demographic characteristics, elicited preferences and personality traits, and link them to their in-survey preferred levels of taxes and donations.

We find that when donations are available, government expenditure on the poor is lower, however, households-in-need are still better off due to disproportionately higher donations,

[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.

corroborating the correlation results of the county-level exercise. This means that, in our setting, private charity crowds out public intervention only to a limited extent. Moreover, the finding that the equilibrium tax rates in the no-donations scenario are not high enough to compensate for the lack of private charity suggests that, in relative terms, people are less driven by inequity aversion than by the direct utility of the act of donating (*warm glow*). Our results indicate that in the United States the widespread availability of private charity 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 presents the county-level descriptive evidence from the United States, Section 3 describes the model and derives some predictions, Section 4 introduces the survey and its results, while Section 5 concludes with a discussion of our findings.

2 Context: poverty, local taxes, and charity in U.S. counties

In this section we collect descriptive evidence on the interplay between charity, local taxation, and poverty by building a county-level dataset of the United States. We measure donation rates at the county level as the total charitable contributions reported in tax filings divided by the total adjusted gross income, both estimated by the Statistics of Income division.[5] For local taxation we employ the five-year average (for the period 2010-2014) of the property taxes per $1000 worth of real estate collected by the National Association of Home Builders[6], due to being one of the more substantial taxes with variance at the county level. Finally, poverty rates are based on the Annual Social and Economic Supplements of the 2016 Current Population Survey (CPS ASEC).[7] We complement the analysis with additional data on relevant county characteristics such as population size, gross domestic product, demographic

[5]Available at the Internal Revenue Service website: https://www.irs.gov/statistics/soi-tax-stats-county-data-2016, accessed 18/05/2021.

[6]Available at: https://www.nahbclassic.org/generic.aspx?genericContentID=250239fromGSA=1, accessed 27/04/2021.

[7]Available at: https://www.census.gov/library/publications/2017/demo/p60-259.html, accessed 10/08/2021.

composition by religion, age, ethnicity, education, and election results.[8] Table 1 reports descriptive statistics for the main variables. 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, and county level poverty rate is slightly below 16%. In addition, Figure 1 shows the geographical variation in the main variables at the county level.

Table 1: Descriptive statistics of the key variables

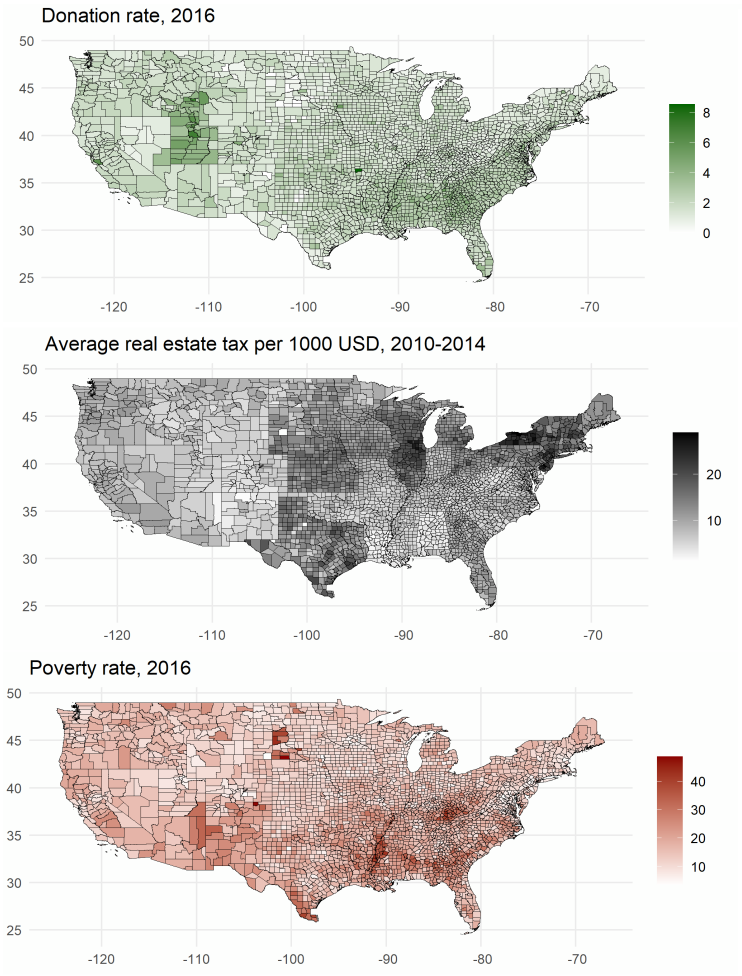
	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Donation rate in 2016	3,129	1.816	0.802	0.000	1.275	2.193	8.552
Property taxes 2010-2014	3,129	9.700	4.635	1.085	6.124	12.503	29.001
Poverty rate in 2016	3,129	15.864	6.263	3.400	11.400	19.100	48.600

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 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.

A look at pairwise correlations between the three main variables (available in Figure 2) shows that donations are negatively associated with taxation and positively with poverty rate, which is in turn negatively associated with local property taxes.

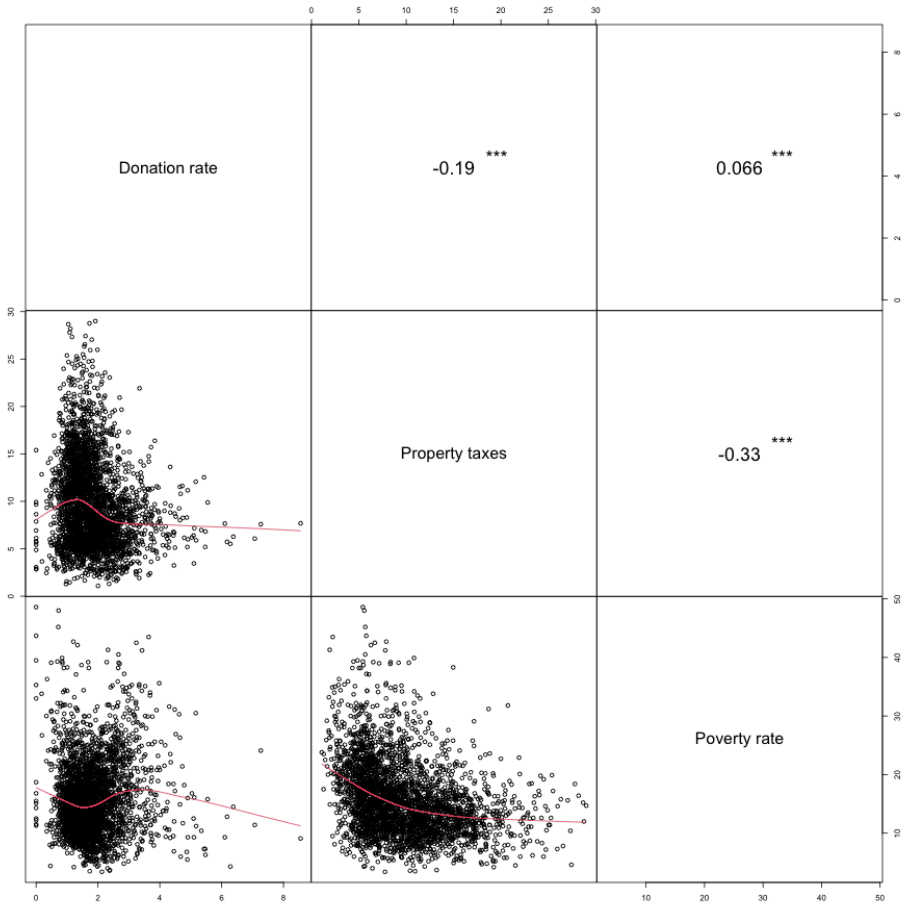
[8]Real GDP per capita data on the county level are based on the calculations of the U.S. Bureau of Economic Analysis. (Available at: https://apps.bea.gov/itable/iTable.cfm?ReqID=70step=1acrdn=5, accessed 28/09/2021.)

Figure 1: 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 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.

Figure 2: 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 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.

As mentioned earlier, the causal links behind these correlations are unclear, so 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, even using 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 jointly affected by one another.

In our first setup we regress poverty rates on donation rates, property taxes, a set of county-level characteristics and state fixed effects. The first column of Table 2 reports the results of the simplest specification, where poverty rate is only regressed 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, while there is a strong negative partial association between taxes and poverty rate. The inclusion of state fixed effects (column 2) results in poverty rates being negatively correlated with both 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, demographic composition according to religion[9], 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. Additional 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 poverty rate of 0.64 percentage points, which is approximately 4% of the mean poverty rate, and 10% of its standard deviation.

Table 2: 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.	

[9]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).

In our second setup (whose results are reported in Table 3), 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 sign of the coefficients reacts substantially to the set of controls we include in the regressions. In the simplest specification which does not control for county characteristics nor state fixed effects, higher poverty rates and higher donation rates both associate 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 poverty rate becomes non-significant. If we were to interpret the estimates causally, a standard deviation increase of donation rates would imply a small decrease in local taxes of around 0.288 per 1000$ of property value, around 3% of the mean.

Table 3: 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 difficult to clarify. According to these preliminary findings higher donations seem to be associated with lower poverty and lower 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.

In order to build a deeper understanding of the issue we therefore propose a simple model of household behavior explaining how donations, taxes, and poverty rate are jointly determined with the mediation of a political election process. Then based on the model setup we administer a survey to a representative sample of U.S. residents to elicit their preferences concerning donations and taxation in different hypothetical scenarios, which are then employed to retrieve equilibrium outcomes.

3 A simple mechanism

To motivate our survey analysis, we build a simple two-stage game between two types of players: the government and the citizens. The government plays first, and sets a tax rate trying to match as closely as possible the aggregate preferences of the citizens. Citizens play second, allocating their budget between consumption and donations given the tax rate and their expectations about the behavior of others. Citizens can either belong to the set of employed households $\mathcal{E}$ or to the set of unemployed households (or households-in-need, earning no income) $\mathcal{U}$. Employed households, indexed by i where $i = 1, ..., |\mathcal{E}|$, receive a gross income w_i of which a fraction τ is paid as taxes. Taxes are composed of a fixed part ($\underline{\tau}$) covering general government expenses, and an additional fraction ($\tau - \underline{\tau}$) which is explicitly set to support households-in-need. The corresponding tax revenue and the donations of employed individuals are equally shared between all households-in-need. We define the "ideal tax rate" of each employed household (denoted by τ_i^*) as the tax rate that maximizes the value of her problem.

3.1 First stage

In the first stage of the game, the government sets the tax rate τ to maximize popularity, or probability of re-election. The popularity of the politician is decreasing in the sum of absolute deviations from each citizen's preferred tax rate (assuming that these are known to

the politician):

$$\tau = \arg\min_{\tau' \geq \underline{\tau}} \sum_{i=1}^{|\mathcal{E}|} |\tau_i^* - \tau'|$$

where τ_i^* is the preferred level of tax rate of each employed household. This expression is minimized by choosing the median of the population's preferences concerning the tax rate, which is equivalent to the preferred tax rate of the median voter. Using a quadratic loss function would result in selecting the average of the ideal tax rates instead of the median. Only employed citizens vote in our setting. Assuming that unemployed households' preferences are also taken into account simply results in a larger tax rate selected in equilibrium in all of the considered scenarios, without qualitatively changing any of the model's implications.

3.2 Baseline case: no charity

For the second stage, we start with the simpler case where charity is not present in the society, meaning that households-in-need are only supported through taxation. Employed households are heterogeneous with respect to an inequity aversion parameter α_i[10], and derive utility from both their own consumption (c_i) and the public good b[11],

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

In our setting, the public good b is the transfer accruing to each household-in-need, which for the sake of simplicity is defined as having 0 income ($w_u = 0$), and labelled "unemployed",

$$b = \frac{1}{|\mathcal{U}|}(\tau - \underline{\tau})W,$$

where $\mathcal{U}$ denotes the set of households-in-need ($\mathcal{U} \cup \mathcal{E} = \mathcal{N}$, where $\mathcal{E}$ is the set of all employed households and $\mathcal{N}$ the set of all households in the society), $W = \sum_{i \in \mathcal{E}} w_i$ is the total wage mass, τ is the tax rate selected by the government player in the first stage and $\underline{\tau}$ is the fraction

[10] In more general formulations of this model, α can be interpreted as the weight of the public good in the utility function, or *pure altruism*.

[11] Similarly to what happens in most public good models, see for instance Andreoni (1988) or Duncan (1999).

of total taxes devoted to the upkeep of the government, which is fixed at an exogenously given level.

Finally, households face a standard budget constraint, where consumption cannot be higher than net income,

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

.

3.2.1 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 household i τ_i^* by maximizing the value of the problem,

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

This implies the following first order condition and optimal taxation:

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

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

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

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

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

3.3 Complete case: charity allowed

In the full scenario employed households are also allowed to contribute to the welfare of the households-in-need with private donations. In this case, the objective function of each

employed household becomes:

$$u(c_i, d_i, b) = log(c_i) + \gamma_i log(1 + d_i) + \alpha_i log(\mathbb{E}[b|\tau]),$$

where, in addition to own consumption and welfare of the households-in-need, individuals also derive utility from their own donations due to the 'warm-glow' effect, with weight represented by the individual-specific parameter γ_i. The budget constraint now also includes donations:

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

.

Contrary to the previous setup, the welfare of unemployed households is no longer known, as it depends on both the individual's donations, and the not-yet-determined donations of other employed households in society. Hence, employed households need to form expectations about the donations of others, conditional on the tax rates they face.

In particular, the expected welfare of the unemployed can be written as the sum of the taxation-related benefit (which is equal to the one in the no-donation case, and known to the household), and the total expected donations in society:

$$\mathbb{E}[b|\tau] = \frac{1}{|\mathcal{U}|}\Bigg((\tau - \underline{\tau})W + d_i + \mathbb{E}\big[\underbrace{\sum_{j \neq i \in \mathcal{E}} d_j}_{D_{-i}} |\tau\big]\Bigg).$$

If the number of individuals in the community is large enough, each household's own donation d_i provides only a small contribution to the expected welfare of the unemployed. This means that without loss of generality we can ignore its role in determining the expected value of donations, to simplify the solution of the maximization problem. We can therefore express the expected benefit conditional on taxes as follows:

$$\mathbb{E}[b|\tau] \approx \frac{1}{|\mathcal{U}|}\Bigg((\tau - \underline{\tau})W + |\mathcal{E}|\mathbb{E}[d_j|\tau]\Bigg),$$

where we rewrite the total sum of donations using the expectation of household i about

average household level donations in society $\mathbb{E}[d_j|\tau]$, given the level of taxes τ.

Concerning the value of this expectation, rationality would require that individuals' guess matches society's actual average donation. In the survey version of our game, which will be presented in Section 4, we will ask respondents to explicitly indicate their expectations alongside their preferences and choices, allowing us to test whether the rationality assumption holds.

3.3.1 Benchmark case: representative agent with rational expectations (RERA)

In the benchmark case, a representative agent would maximize her utility knowing that everybody else solves the same optimization problem. In particular, this means that expected donations coincide with the realized aggregate level of donations in society. Since in the benchmark case all individuals have the same preferences and budget, we can treat expected donations as if they were the solution to the individual optimization problem,

$$V(w_i, W, \tau) = \max_{d_i} log\big((1-\tau)w_i - d_i\big) + \gamma_i log(1+d_i) + \alpha_i log\left(\frac{1}{|\mathcal{U}|}\left((\tau - \underline{\tau})W + |\mathcal{E}|d_i\right)\right).$$

However, the individual decision maker solves for the 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

$$\text{w.r.t. } d_i : \frac{1}{w_i(1-\tau) - d_i} = \frac{\gamma_i}{1+d_i} \tag{3}$$

$$d_i^* = max\left\{\frac{\gamma_i w_i(1-\tau) - 1}{1+\gamma_i}, 0\right\}. \tag{4}$$

d_i^* is positive whenever:

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

meaning that there will be a positive level of donations in the society whenever the repre-

sentative agent is characterized by a high enough level of warm glow (equal to at least the inverse of the net wage).

From 4, 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 warm glow parameter, we can plug back the values of the interior solution to obtain the value of the problem in the benchmark case:

$$V(w_i, W, \tau) = log\left(\frac{w_i(1-\tau)-1}{1+\gamma_i}\right) + \gamma_i log\left(\frac{\gamma_i w_i(1-\tau)-1}{1+\gamma_i}\right) + \alpha_i log\left(\frac{1}{|\mathcal{U}|}\left((\tau-\underline{\tau})W + |\mathcal{E}|\frac{\gamma_i w_i(1-\tau)-1}{1+\gamma_i}\right)\right),$$

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 $W = |\mathcal{E}|w_i$, the first order condition with respect to τ,

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

implies

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

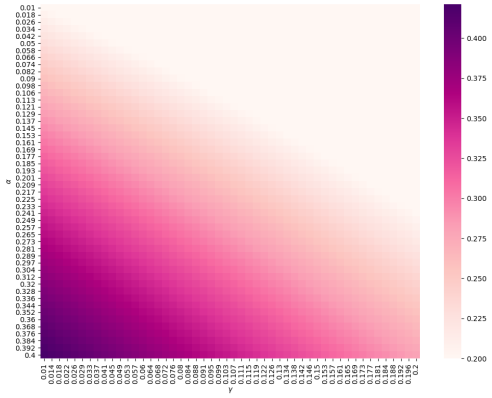
yielding a solution for the preferred tax rate, τ^*.

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 decreasing inequity, inequity aversion does not affect optimal donation rates. As a consequence total benefits for the poor increase in both dimensions. However, if we use the scenario where donations are not allowed as comparison,

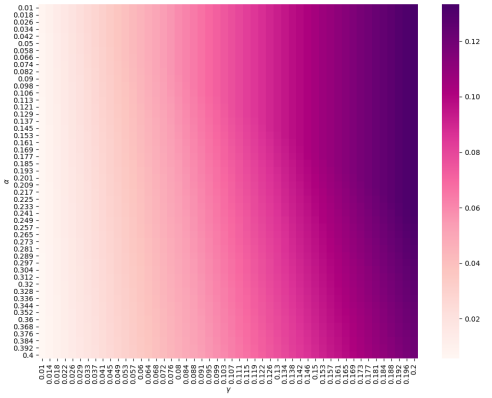
we can see that for regions with somewhat high inequity aversion and warm glow, total benefits would decrease by allowing donations in society. So depending on the preferences representing social values, allowing donations might or might not benefit those that they are designed to target even if donation expectations are correct, as a consequence of the equilibrium brought by the taxes set by the politician.

Figure 3: Taxation, donations and benefits for the representative agent with rational expectations

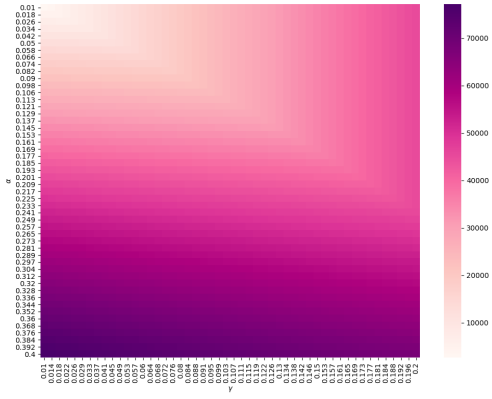
(a) Equilibrium total tax rate



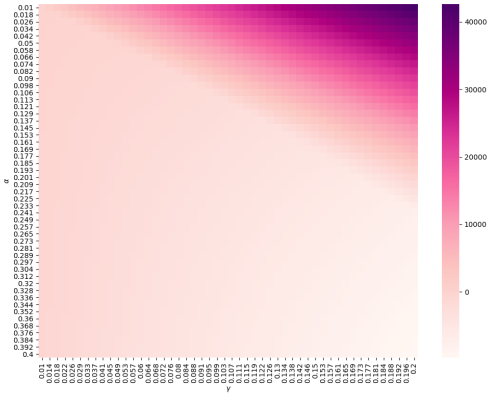
(b) Optimal donation rate



(c) Total benefit for the household-in-need



(d) Benefits with donations vs. without



Notes: the 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 expenditure, household income is set at \$60,000.

3.3.2 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, as well as household specific expectations, which we treat as model parameters without imposing any assumption, and derive again the optimal level of donations 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:

$$V(w_i, W, \tau) = \max_{d_i} log\big((1-\tau)w_i - d_i\big) + \gamma_i log(1+d_i) + \alpha_i log\bigg(\frac{1}{|\mathcal{U}|}\big((\tau - \underline{\tau})W + |\mathcal{E}|\mathbb{E}[d_j|\tau]\big)\bigg),$$

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

$$\text{w.r.t. } d_i : \frac{1}{w_i(1-\tau) - d_i} = \frac{\gamma_i}{1+d_i} \tag{5}$$

$$d_i^* = max\left\{\frac{\gamma_i w_i(1-\tau) - 1}{1+\gamma_i}, 0\right\}. \tag{6}$$

From this, we can also compute the optimal level of consumption as:

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

Plugging back the values of the interior solution we can obtain the value of the problem:

$$V(w_i, W, \tau) = log\bigg(\frac{w_i(1-\tau) - 1}{1+\gamma_i}\bigg) + \gamma_i log\bigg(\frac{\gamma_i w_i(1-\tau) - 1}{1+\gamma_i}\bigg) + \alpha_i log\bigg(\frac{1}{|\mathcal{U}|}\big((\tau - \underline{\tau})W + |\mathcal{E}|\mathbb{E}[d_j|\tau]\big)\bigg)$$

, 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. When computing the first order condition, it is important to consider that expected donations could depend on the level of taxation. Indeed, as additional taxation and donations both contribute to the welfare of the unemployed, a belief that higher taxes would result in lower average donations in society is reasonable. We should then allow for the derivative of expected donations with respect to the tax rate τ to

be different from 0, obtaining τ_i^* as the numerical solution to the following expression:

$$\frac{w_i(1+\gamma_i)}{w_i(1-\tau_i^*)-1}+\frac{(1+\gamma_i)\gamma_i^2 w_i}{\gamma_i w_i(1-\tau_i^*)-1}=\frac{\alpha_i W+|\mathcal{E}|\frac{\partial \mathbb{E}[d_j|\tau_i^*]}{\partial \tau_i^*}}{(\tau_i^*-\underline{\tau})W+|\mathcal{E}|\mathbb{E}[d_j|\tau_i^*]}.$$

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 $\mathbb{E}[d_j|\tau]$. 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 on the welfare of the households-in-need.

4 Survey evidence

In order 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[12] to be representative of the population at large in terms of age, gender and ethnicity. The survey requires a completion time of approximately 40 minutes, and asks respondents to go through three main sections. The full text of the questionnaire is available upon request.

The first section of the survey replicates the structure of the game presented in Section 3. We ask respondents to imagine their preferences on taxation and their expectations and behavior concerning donations in six hypothetical scenarios. 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 tax-

[12] www.prolific.co.

ation collected for that purpose, or through private donations (full 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 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.

4.1 Descriptive statistics

Consistently with the 2019 American Community Survey estimates[13], 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 explicitly targeted by the representative sample requirements, it is interesting to notice that 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.[14] The fraction of middle income households (reporting a gross income of between $50,000 and $90,000) is instead 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.

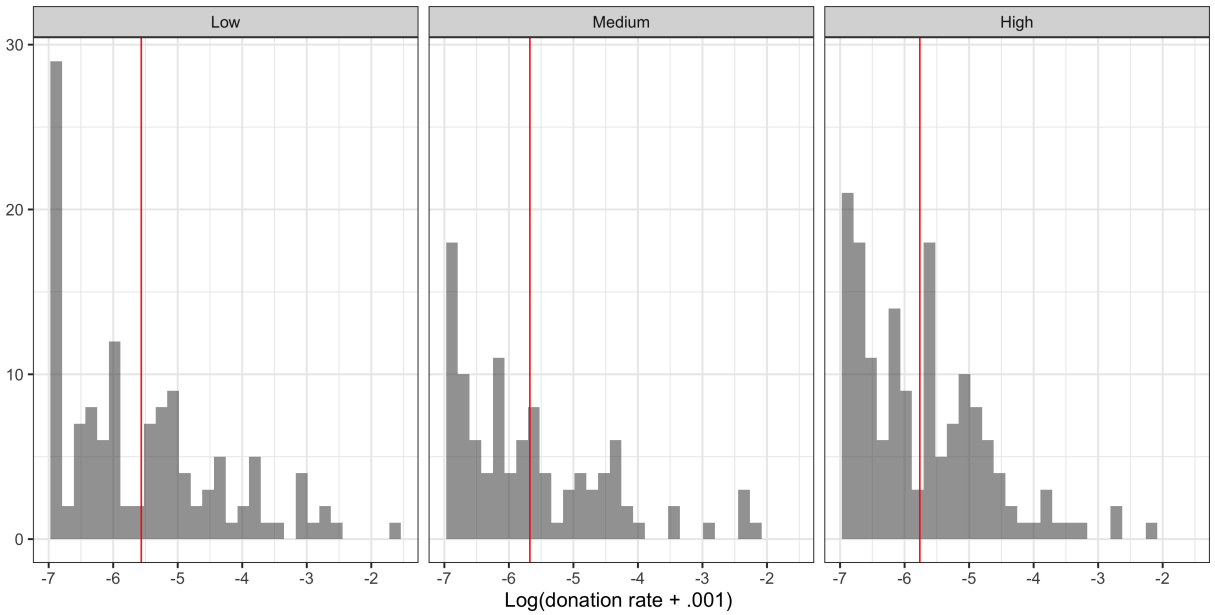
Not surprisingly given the over-representation of high income households, the sample is also characterized by a particularly low fraction of individuals with less than a high school diploma and of high school graduates (0.3% and 7.9% versus approximately 10% and 28% in

[13]Aggregate demographic information is available at: https://data.census.gov.
[14]Data on income brackets available at: https://censusreporter.org/topics/income/.

the overall population). At the opposite end of the spectrum, 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 declares 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 engages in volunteering occasionally, and reports 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 category of income. Although respondents from the lowest income category are more likely to not donate, the average donation rate slightly decreases with income.

Figure 4: 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, while to compute yearly income we impute the middle value of the selected income bracket.

Table 4: 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%

4.2 Preferences and predicted behaviors in hypothetical scenarios

In order 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 5: 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 5, 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.[15] 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.[16] And 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. Afterwards, 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 on 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

[15] 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).

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

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

Figures 5 and 6 show the distribution of the main variables of interest: preferred tax rates in each scenario (5), and respondents' own and expected donation rates for each level of additional tax rate (6). As expected, respondents tend to prefer higher additional tax rates when donations are not allowed, compared to the case in which they can also contribute to the welfare of the unemployed with private donations. We can also see that higher in-game income results in higher preferred taxes on average.

Figure 5: Ideal tax rate with and without donations

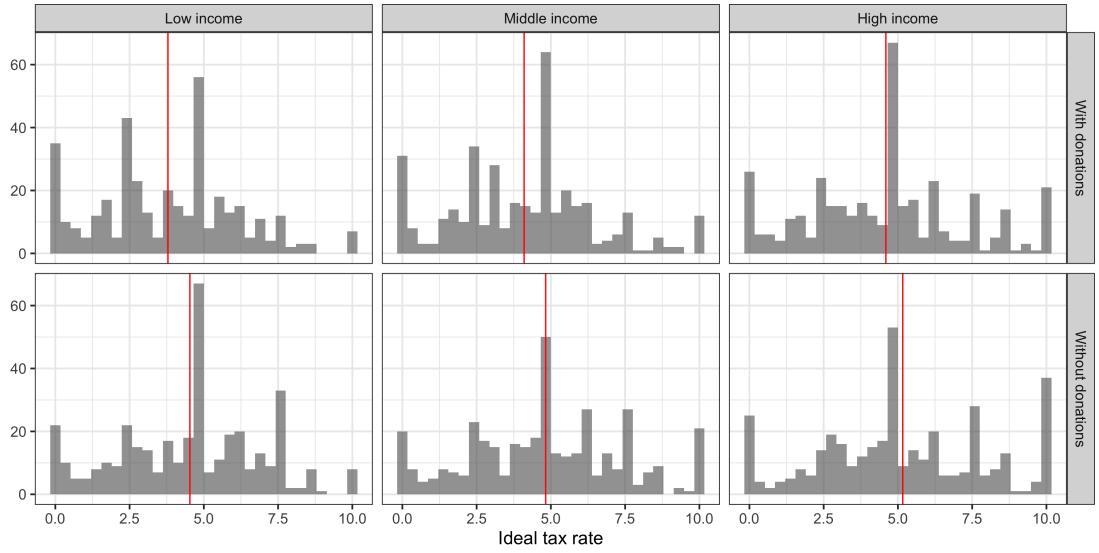


Table 6: Ideal tax rates regressed against in-game income and donation availability

	Estimate	Cluster s.e.	t-value	p-value
Middle income	0.29378	0.09288	3.163	0.00169 **
High income	0.63237	0.10622	5.954	5.99e-09 ***
Donations allowed	-0.73905	0.12930	-5.716	2.22e-08 ***
Middle income X Donations allowed	0.01309	0.12726	0.103	0.91812
High income X Donations allowed	0.17031	0.13485	1.263	0.20738
Multiple R-squared(full model): 0.6719	Adjusted R-squared: 0.6054			
Multiple R-squared(proj model): 0.08573	Adjusted R-squared: -0.09953			

Notes: The table displays the regression of ideal tax rates on in-game income level interacted with whether donations are allowed, using respondent-level fixed effects. Standard errors are clustered on the respondent level. *p<0.1; **p<0.05; ***p<0.01

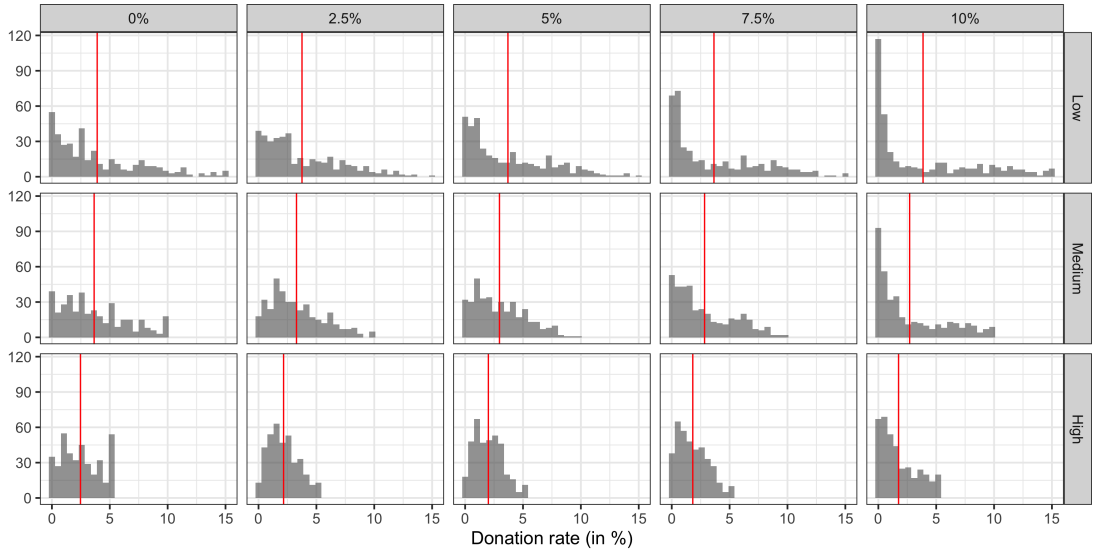
Donation rates in Figure 6a decrease (although not strictly monotonically) with the level of additional tax rates for all levels of income, meaning that respondents are more willing

to intervene with private donations when the additional taxes intended to support them are lower. However, donation rates tend to be higher for lower level of incomes, suggesting that individuals might target an ideal level of donations (which could be conceptualized as a bliss point) which is almost uncorrelated with their own level of income. This evidence, paired with the lack of a strong inverse relationship between donations and the level of additional taxation, provides support to the existence of a strong warm glow effect, while de-emphasizing the contribution of inequity aversion.

Expected donation rates (Figure 6b) follow a similar pattern to that of own donations, with respondents reporting higher expectations for lower levels of additional taxes, although not strictly monotonically so. Of particular interest are the results reported in Table 7, providing a mean comparison of the actual and expected donation rate for each level of additional taxes. Expectations systematically overestimate the actual donation rate by between 0.5 and 1 percentage points, suggesting that individuals' expectations might not be rational, but rather suffer from an exaggeration bias. The last two columns test this hypothesis by implementing the rational expectations test proposed by D'Haultfoeuille et al. (2021). We repeat the test for each level of additional tax rates τ, and reject the null hypothesis of rational expectations at the 5% level for the cases in which τ is equal or larger than 5% (that we consider to be closer to reality, leading to less extreme in-game donation behaviors).

Figure 6: Donation rate: own behavior and expectations

(a) Donation rate by additional tax rate and level of income



(b) Expected donation rate by additional taxation level

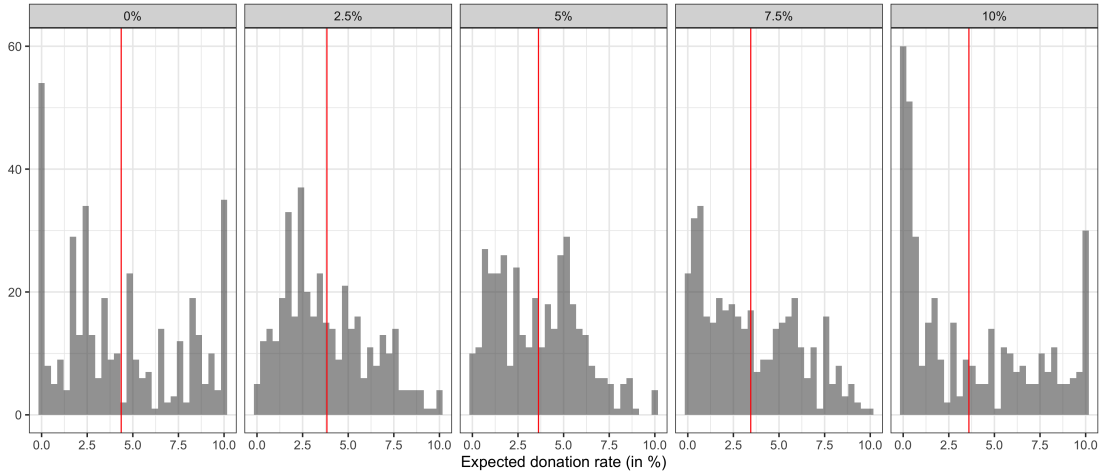


Table 7: Expected versus realized average donation rates

	Donation rate			**RE test**	
τ	Expected average	Realized average	Difference	test statistic	p-value
0%	4.36%	3.36%	1%	0.46	0.12
2.5%	3.83%	3.07%	0.76%	0.09	0.06
5%	3.62%	2.87%	0.75%	0.14	0.04
7.5%	3.45%	2.75%	0.7%	0.12	0.04
10%	3.60%	2.73%	0.87%	0.21	0.01

4.3 Simulation results

Starting from the respondents' choices in the six hypothetical scenarios, we can compute the two main equilibrium outcomes of our model, namely the equilibrium tax rate τ and the benefit accruing to each household-in-need b with and without the availability of private donations. These measures should be understood in the context of the model detailed in Section 3, using the choices of respondents as optimal responses.

As each respondent states her preferences and predicted behaviors for three different levels of income, we first have to construct a hypothetical society where each respondent contributes with the weighted average of her choices for each level of income. In order to match the actual income composition of the U.S. society, the weights of each income level are based on the fractions of low, middle and high-income households appearing in the 2019 version of the American Community Survey.[17]

First, the equilibrium tax rate using the entire sample is retrieved as the median of the N individual ideal tax rates in the hypothetical society. We obtain an equilibrium tax rate of 5% for the taxation-only case compared to 4.33% when donations are allowed. In order to retrieve the benefit accruing to each household when charity is available we also need to compute the average level of donations. To retrieve this variable we consider the preferred donation of each respondent for the level of income which was randomly assigned to her when the tax rate corresponds to its equilibrium level. However, since the median tax rate is not necessarily equal to any of the options proposed in the survey, we compute donations for each individual given the equilibrium taxes as a linear interpolation between the neighboring options given to the survey participants.[18] The results of this exercise are reported in Table 8.

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

[18] For instance, the donations of household i given wage level w_i and taxes τ is computed such that $d_i(\tau, w_i)|_{\tau=4.33\%}$ is given by the appropriate linear combination of $d_i(\tau, w_i)|_{\tau=2.5\%}$ and $d_i(\tau, w_i)|_{\tau=5.0\%}$.

Table 8: Equilibrium results

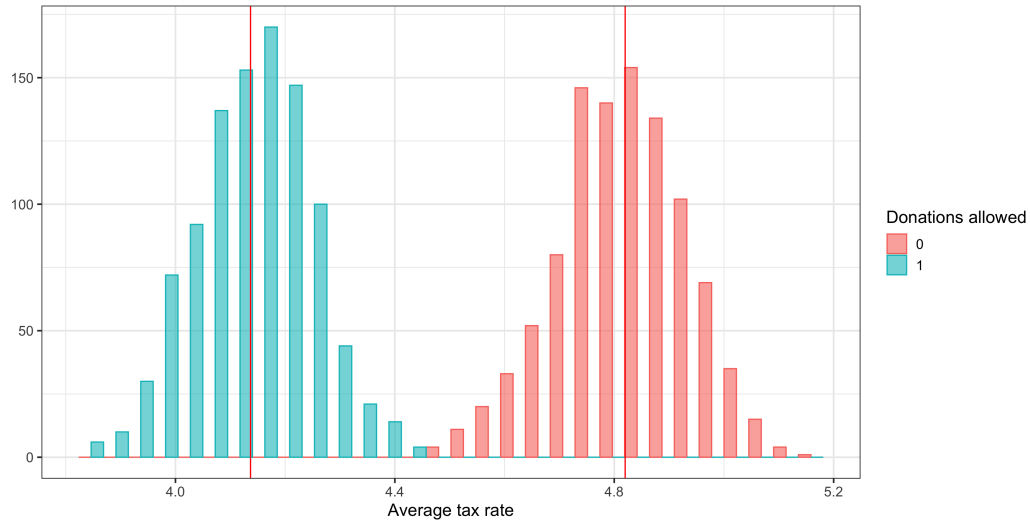
	Taxation-only case	Donations-allowed case
Additional tax rate	5%	4.33%
Average donation rate	-	2.94%
Income of each household-in-need	$19,946	$ 27,891

The results confirm that equilibrium tax rates are higher in the no-donations case, as indicated by the county-level evidence earlier. However, they also show that the welfare of the unemployed is significantly higher when donations are allowed. This result highlights how in this setting the difference between the equilibrium tax rates is not sufficiently high to counterbalance the absence of private donations, while the patterns of charitable behavior suggest the presence of an ideal level of donations almost independent of income and tax rates. This could explain the much higher welfare accruing to households-in-need when donations are allowed.

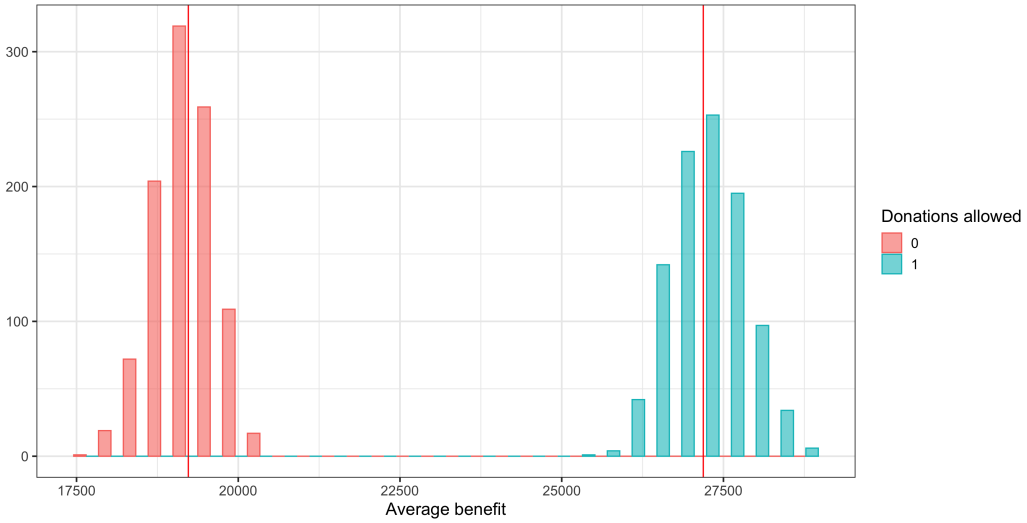
In order to have an idea about the distributional properties of the results, we construct 1000 bootstrap samples and compute the equilibrium outcomes for each. The results are summarized in Figure 7a for the equilibrium tax rates, and Figure 7b for the benefit accruing to each household-in-need. As the distribution of medians are not as expressive due to bunching (the median is always equal to 5% in the taxation-only case), the figures report the result for the average preferred additional tax rate, corresponding to a quadratic loss function of the politician's first-stage problem in the model setup. The results clearly suggest that the equilibrium tax rates are lower when donations are allowed, however, the magnitude of the difference is small, only around 0.7 percentage points ($\sim$14% of the charity-allowed-case). As the second figure indicates, this difference is not enough to compensate for the lack of donations in society, resulting in around $8,000 ($\sim$ 30%) less yearly benefits for the households-in-need.

Figure 7: Equilibrium tax rates and benefits of the simulations

(a) Additional tax rate in equilibrium



(b) Unemployed benefit in equilibrium



We conclude this section by presenting the outcomes of applying the simulation procedure described above to selected subsamples based on political attitudes, religion, and geographic area. We do not find qualitatively different results from the ones reported in the above section for any of the considered subsamples. However, these results show that the availability of donations have a higher equilibrium benefit when the sample consists of liberals, respondents from the West and the North-East, and Roman Catholics. As expected, we can also see lower

taxes for conservatives, the Centre and the South, and for Protestants.

Table 9: Results of the model simulation based on different subsamples

Dimension	Categories	Variable of interest	Taxation-only	Donations-allowed
Political attitudes	Liberals	Equilibrium tax rate	5.25%	5%
		Average donation rate	-	3.17%
		Income of a household-in-need	$20,944	$ 31,393
	Conservatives	Equilibrium tax rate	4.5%	3.75%
		Average donation rate	-	3.15%
		Income of a household-in-need	$17,952	$ 26,218
Geography	West and North-East	Equilibrium tax rate	5%	4.65%
		Average donation rate	-	3%
		Income of a household-in-need	$19,947	$ 29,404
	Centre and South	Equilibrium tax rate	5%	4%
		Average donation rate	-	2.9%
		Income of a household-in-need	$19,947	$ 26,508
Religion	Catholics	Equilibrium tax rate	5%	5%
		Average donation rate	-	3.68%
		Income of a household-in-need	$19,947	$ 32,879
	Protestants	Equilibrium tax rate	4.75%	3.65%
		Average donation rate	-	2.85%
		Income of a household-in-need	$18,949	$ 25,244
	No religious identity	Equilibrium tax rate	5%	3.75%
		Average donation rate	-	2.83%
		Income of a household-in-need	$19,947	$ 25,579

4.4 Background characteristics and in-game behavior

There are four key in-game behavioral variables (donation rates, expectations about donation rates, the difference between the two, and preferred tax levels) determining the simulation results, for which we can examine partial correlations with respect to other relevant background characteristics. For each individual we average through the values across scenarios, and then regress them on demographic information, attitudes towards inequity and fairness, preferred size of unemployment benefits, and psychological factors (risk-aversion and patience as in Falk et al., 2016, along with real-life charitable behavior. We construct principal components based on each of the variable groups of inequity attitudes, and unemployment benefits due to their high cross-correlation, and we include those in the regressions.

Table 10 presents the OLS estimates of the regressions described above, and displays the means and standard deviations for the outcome variables at the bottom. We can see that on average the in-game donation rates are close in magnitude to the aggregates we observe in county-level data. As we already noted, 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, the positive

relationship between real life donation rate and in-game donation rate, and the negative relationship between conservatism and preferred tax levels provide evidence that there is consistency between the survey respondents' in-game behavior, and their in-life attributes.

Interestingly, our results point to in-game donation rates being lower for women. Conservative opinions also seem to associate negatively with the propensity to donate, as well as the preferred level of taxes, while more inequity averse individuals still prefer lower donations, but have higher ideal tax rates. Somewhat surprisingly, being Protestant does not seem to correlate strongly with own in-game donations nor with ideal tax rates, however it negatively relates to expected donation rates. In addition, living in a predominantly Protestant area negatively correlates with preferred tax rates, showing the importance of majority religion on regional social norms as described by Pugh (1980). Volunteering also correlates with in-game own and expected donations negatively, suggesting that donation and volunteering might be substitutes rather than complements. Finally, being more forward looking and risk averse are also negatively associated with donations, which is consistent with a behavior that prioritizes higher savings against present expenditures, in this case, donations.

Table 10: In-survey behavior outcomes and participant background

	Dependent variable:			
	Donation rate	Expected donation rate	Preferred taxes	Donation difference
	(1)	(2)	(3)	(4)
Tertiary educated	−0.150	0.450*	−0.124	−0.519*
	(0.237)	(0.273)	(0.261)	(0.266)
Female	−0.466**	−0.507**	−0.366	0.007
	(0.209)	(0.241)	(0.231)	(0.235)
Age 28-37	−0.554	−0.887**	−0.723*	0.044
	(0.357)	(0.411)	(0.394)	(0.401)
Age 38-47	0.244	−0.238	−0.216	0.038
	(0.393)	(0.452)	(0.433)	(0.441)
Age 48-57	−0.179	0.142	−0.344	−0.675
	(0.390)	(0.449)	(0.430)	(0.438)
Age 58+	−0.584	−0.519	−0.494	−0.397
	(0.354)	(0.408)	(0.391)	(0.398)
Black	0.277	0.508	−0.492	−0.339
	(0.307)	(0.353)	(0.339)	(0.344)
Asian	−0.249	0.837**	−0.713*	−1.307***
	(0.364)	(0.419)	(0.402)	(0.408)
Hispanic	0.441	0.472	0.235	0.018
	(0.430)	(0.495)	(0.475)	(0.483)
Other	0.010	−0.671*	−0.148	0.693*
	(0.343)	(0.395)	(0.379)	(0.385)
Majority religion is Protestant	−0.246	0.041	−0.598**	−0.350
	(0.234)	(0.270)	(0.258)	(0.263)
Own religion is Protestant	−0.038	−0.653*	−0.022	0.649*
	(0.295)	(0.339)	(0.325)	(0.331)
Goes to church at least monthly	0.115	0.249	0.200	−0.128
	(0.228)	(0.262)	(0.251)	(0.256)
Conservative scale	−0.126**	−0.064	−0.173***	−0.047
	(0.054)	(0.062)	(0.060)	(0.061)
log(real life donation rate+0.001)	0.190***	0.089	0.130	0.109
	(0.072)	(0.083)	(0.079)	(0.081)
Real life donation rate is 0	0.378	0.547	0.201	−0.387
	(0.466)	(0.537)	(0.514)	(0.523)
Real life regular volunteering	−0.411*	−0.489**	−0.021	−0.074
	(0.210)	(0.242)	(0.232)	(0.236)
Inequity aversion princ. comp.	−0.348***	−0.188**	0.135	−0.097
	(0.079)	(0.091)	(0.087)	(0.089)
Unemployment benefit princ. comp.	0.190***	0.041	0.147**	0.196***
	(0.064)	(0.074)	(0.071)	(0.072)
Number of right answers	−0.441***	−0.499***	0.032	0.111
	(0.119)	(0.137)	(0.132)	(0.134)
Forward-looking preferences	−0.070	−0.038	0.083	−0.012
	(0.049)	(0.056)	(0.054)	(0.054)
Risk-loving preferences	−0.096**	−0.086*	−0.052	0.002
	(0.043)	(0.050)	(0.048)	(0.049)
Married or cohabiting	−0.033	−0.532*	−0.095	0.612**
	(0.250)	(0.288)	(0.276)	(0.281)
Number of children	0.128	0.267**	0.030	−0.118
	(0.098)	(0.113)	(0.108)	(0.110)
Constant	4.673***	4.185**	5.618***	0.995
	(1.547)	(1.782)	(1.706)	(1.735)
Observations	380	380	380	380
R^2	0.302	0.234	0.148	0.154
Adjusted R^2	0.246	0.173	0.080	0.086
Residual Std. Error (df = 351)	1.790	2.062	1.975	2.009

Notes: Population size of the respondent's area and log of their estimated real life income are also included in the regressions, but to ease visibility we omitted them from the table as they are not statistically significant at the 10% level. Standard errors are in parentheses. Donation difference refers to the difference between the individual's own donation rate vs. their expected donation rate for the aggregate level.
*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) or 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, neither for individual respondents nor on average. This 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 public good provision, in line with the experimental findings of Eckel et al. (2005). We also find that survey respondents systematically overestimate the average donation rate in society compared to their realized average contribution, which might result in a sub-optimal public choice in terms of poverty reduction. Our survey results are also in accord with the results of the county-level evidence in terms of signs, which also suggested 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 benefits to the poor. This finding suggests that, in relative terms, people in our U.S. sample are less driven by inequity aversion (the weight given to the welfare of the households-in-need in the utility function) than by warm glow. This corroborates the findings of Null (2011) that only few donors are willing to pay to check whether their donations actually reach their declared target, pointing to the fact that the act of charity itself might be driving individuals' donation behavior, rather than the effects of charity on the welfare of those it is meant to help.

Several stylized facts emerged from the analysis that cannot be reconciled with the model of household behavior presented in the paper, among others the positive correlation between own donations and expected donations of others. This piece of evidence points to the existence of some degree of anchoring to the perceived social norms, contradicting the free riding behavior inherent in the baseline model. To shed more light on these questions, further and

more targeted research is necessary.

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. (2006). Chapter 18, Philanthropy. In *Handbook on the Economics of Giving, Reciprocity and Altruism*, volume 2, pages 1201–1269.

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

Ariely, D., Bracha, A., and Meier, S. (2009). Doing Good or Doing Well? Image Motivation and Monetary Incentives in Behaving Prosocially. *American Economic Review*, 99(1):544–555.

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.

Carpenter, J. and Myers, C. K. (2010). Why volunteer? Evidence on the role of altruism, image, and incentives. *Journal of Public Economics*, 94(11):911–920.

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

DellaVigna, S., List, J. A., and Malmendier, U. (2012). Testing for Altruism and Social Pressure in Charitable Giving *. *The Quarterly Journal of Economics*, 127(1):1–56.

D'Haultfoeuille, X., Gaillac, C., and Maurel, A. (2021). Rationalizing rational expectations: Characterizations and tests. *Quantitative Economics*, 12(3):817–842.

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 (2021a). Poverty rate (indicator). doi: 10.1787/0fe1315d-en (Accessed on 28 May 2021).

OECD (2021b). 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.