The U-Shaped Charitable-Giving Curve

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Abstract

Is charitable giving is U-shaped in income? That is, do low- and high-income households donate a higher fraction of their income to charity than the middle class? Decades of correlational studies have found that the share of income given to charity follows a U-shape pattern in the United States, but scholars continue to debate whether the apparent U-shape is a statistical mirage, or accurately characterizes giving across the income distribution. We partnered with a real charity to conduct a charitable giving experiment where relative endowments are revealed to participants. We experimentally verify that random placement in an income distribution causes a U-shaped giving-income curve. The U-shape observed in real world data therefore is plausibly not spurious, but a real effect of relative economic status on giving decisions.

Keywords : Charitable-giving, behavioral economics, relative income, lab experiments
JEL Classification : C91; D31; D64; D91; H23

1 Introduction

The fraction of income Americans donate to charity appears to follow a "U" shape relationship with income. That is, the share of income given to charity is lower on average for middle-income households than for low- or high-income households. Even though this stylized fact has been well-known for decades, whether giving is U-shaped in reality (as opposed to a spurious byproduct of data limitations) remains vigorously debated. And if the U-shape does exist, *why* giving should follow this pattern remains a puzzle.

The U-shape has been replicated many times using various sources of US data (cf. Clotfelter 1980; Clotfelter and Steuerle 1981; Clotfelter 1985; Andreoni 2006). The debate about U-shape's existence and potential causes is particularly heated regarding the lower end of the income distribution. The literature suggests that lower-income households might appear to give a greater share of their incomes because of statistical artefacts in the reporting of low-income giving (Schervish and Havens 1995, 1998, 2001), or because religiosity is correlated with lower income and higher giving (Jencks 1987, Auten et al. 2000), or because low-income average giving is distorted by positive outliers with unobserved high wealth or high implicit income (McClelland and Brooks 2004; James and Sharpe 2007; Meer and Priday 2020).[1] High-income households receive less attention, but it is often assumed that they donate larger shares of their incomes than middle-income households because charitable contributions, especially to secular causes, are a luxury good that people give to out of excess income once their basic needs are met.[2] Thus, the U-shaped pattern is thought to arise because of two different influences on the low and high ends of (measured) giving behavior, which together generate the surprising nonlinearity.

Depending on what it is, the root cause or causes of this U-curved pattern could have important implications for the social science and the public policy of charitable contributions. While there is

vigorous debate about the magnitude of changes in the income distribution, there is general agreement that the distribution of income in the United States has grown at least somewhat more unequal in recent decades (Auten and Splinter 2022; Piketty et al 2018), and that the distribution of giving has become more lopsided and driven by major donors, at least, within any given year (Duquette 2021, Rooney et al 2021). However, it is an open question how and why high-income donors react to changes in the income distribution that are difficult to measure and typically associated with other policy shifts (Duquette 2018, Splinter 2018). In short, the U-curve is not just a statistical curiosity, but a measure of how little we understand about giving behavior across the income distribution and how public policy might affect that giving.

This paper presents the first evidence of a *causal relationship* between income placement and the U-shaped charitable giving curve. We find that one's relative placement in the income distribution causes changes in giving that replicate the U-shape, suggesting that in the real world changes in social hierarchy or income rank may have an effect *per se* on real choices. Partnering with a real charity, we randomize participants' endowments in a laboratory experiment. We inform them of their relative position, and solicit donations. We observe robust evidence that one's placement relative to others affects giving behavior, with lower shares of income donated in the middle of the distribution than at the low and high ends. By repeating the experiment over several rounds, we identify the effect of placement from within-individual changes in giving.

The U-shape curve is clearly evident across a variety of specifications. We observe it in our raw data; across subjects of different self-reported socioeconomic statuses; when controlling for person fixed effects (within-subject), or other variables of interest; in a quantile regression framework; and in nonparametric, fractional polynomial, and partially linear representations. Our findings are robust to varying donation match rates for contributions and income distributions. We

do not find significantly different patterns when experimental endowments are purely random versus partly earned through an effort-rewarding task.

Previous literature has attempted to explain the U-shaped giving-income curve as a byproduct of measurement error or of other, unobserved factors that relate to both income and giving. In our experimental framework, these standard observational data-based critiques are inapplicable. Donations are truthful and recorded without measurement error. Moreover, because income is assigned at random, the effect of income on giving is not confounded by other influences on giving behavior. It follows that the U-shape observed in real-world tax and survey data may be the direct, causal result of income position on generosity.

2 Background

This section provides a brief overview of the existing literature on U-shaped charitable giving curves, why they are studied, and the theoretical and empirical challenges associated with them.

How relative placement or rank affects pro-social behavior like charitable giving is of significant interest to nonprofit studies and social science more broadly.[3] Standard economic models of charitable giving that characterize contributions as inputs to a public good imply that those with more income or wealth should contribute greater proportions than people of similar preferences but lower socioeconomic status (SES), because the marginal value of consumption is higher for those of lesser means (see e.g. Bergstrom et al. 1986). More recent models that add terms for the warm glow of giving can make this implication less sharp, but unless warm glow varies by income, will never imply that the share of income given should decrease in income (Andreoni 1990; Ribar and Wilhelm 2002; Duquette and Hargaden 2021).

But we often do not observe rising shares of income donated in real-world data. Instead, US data tends to show higher shares of income donated by low- and high-income households than

middle-income households: a "U" shape. Clotfelter and Steuerle (1981) is the first paper to our knowledge to document this striking fact. Clotfelter (1985) confirms the presence of U-shapes in 1950, '60 and '70, and '80 individual income tax return data. Auten et al. (2000) generate the U-shape for tax return data for 1991–95 and suggest that it is driven by high religiosity at the low end and secular giving at the high end. List (2011) also notes poor households' tendency to give to religious causes as one explanation for their relatively higher giving. Because tax return data do not reveal the donor's target charity, this is an untestable conjecture without alternative data sources.

A separate vein of literature has attempted to answer this question using survey data, which does not have the same reporting limitations as tax returns. Jencks (1987) compares tax and survey sources and finds general support for the U-shape, while noting the limitations of each data source. Three papers by Schervish and Havens (1995; 1997; 1998) argue (using data from the National Survey of Giving and Volunteering) that the U-shape is a result of mishandling non-participating households at the low end of the distribution. A sequel by the same authors using the Survey of Consumer Finances finds that high-SES households do give higher income shares on average than the rest of the distribution, but only for very high levels of income, and only because of the influence of a generous outlier minority (Schervish and Havens 2001). James and Sharpe (2007) argue that the giving-income U-curve is neither an artefact of data limitations nor driven by religiosity using data from the Consumer Expenditure (CEX) Survey. The CEX data disentangle religious giving from secular charitable giving. James and Sharpe verify the U-shape in *both* religious and secular giving, suggesting that whatever had generated a U-curve in previous studies was not specific to income tax return data, nor explicable by differences in religiosity by income class.[4] Wilhelm (2005, table 1, column 5) finds a U-shape in giving/income in the Panel Study of Income Dynamics PSID/COPPS data, with the exception of the highest income group, who may

not be representative of most high-income households because the PSID does not contain a representative sample of the richest 5% of Americans (Bosworth and Smart 2009).[5]

Since then, a growing collection of evidence suggests that the U-shape giving curve may represent a real pattern in giving rather than a quirk of US data sources, at least in part. First, the observed decline in the giving-income ratio as income increases from a low to a moderate level has been replicated outside the US: using data from the UK (Breeze 2006), from the Netherlands (Wiepking 2007), from Austria (Neumayr and Pennerstorfer 2021), and from Denmark (Benediktson 2018). None of these four studies find that the giving/income ratio is increasing as incomes move from middle ranges to high incomes; it is not clear whether this is because the right side of the "U" is only present in American giving data for real reasons (*e.g.* the rising marginal subsidy in the US context for higher incomes because policy allows for deduction against rising marginal tax rates) or statistical reasons (perhaps the US data samples high earners differently). However, they do all find that the giving/income ratio declines in income at the low end of the income distribution, which is the puzzling portion of the U-pattern for economic theory and what has prompted so much debate in the literature about methodology and religious giving. Wiepking and Heijnen (2011) find that potential donors of varying incomes in the Netherlands tend to anchor the amounts they give on information about others' giving, so that a declining giving/income ratio could come about from constant giving divided by variable income. Other work has found that there is a U-shape in UK data calculated as a share of spending, rather than income, by income group, although the upturn at the high-income end is typically modest and not observed in every survey wave (Banks and Tanner 1999, fig. 2.4; Cowley et al 2011, table 4.3c).

Furthermore, a growing body of economics and social psychology has found experimentally that relative income affects the intensity of prosocial behaviors. Piff et al. (2010) find that lower-income households are more charitable and compassionate to cope with problems they cannot solve

through their individual resources. Erkal et al. (2011) show a non-monotonic relationship between earnings and contributions to within-lab redistribution. Andreoni et al (2021) find that high-SES households in the Netherlands are slightly more likely than low-SES households to perform a prosocial task, possibly because they behave more prosocially, or possibly because it was less burdensome to high-SES households to perform the chosen task (returning a misdelivered letter containing money). These studies are not identical to finding a U-shaped pattern in contributions to real-world charities, but are strongly suggestive of behavioral effects of socio-economic status on prosocial behavior more generally.

3 Experimental Design

Our paper presents direct experimental evidence that the U-curve exists and is not driven by data limitations nor by confounding influences on both giving and income. In particular, we make two important decisions that existing experimental literatures on behavioral giving do not. Firstly, our measure of relative placement is continuous rather than discrete, permitting finer investigation of a U-shape relationship. Secondly, our redistribution is to an external charity, rather than other participants within the lab who may be seen as competitors. Our approach abstracts from within-lab fairness concerns, and we believe better reflects an atomistic view of contributions. We discuss our experimental design in greater detail below.

To identify the effect of relative income on charitable giving, we conducted a lab experiment at the University of Tennessee's Experimental Economics Lab.[6] One-hundred and twenty participants played a donation game over 24 rounds, generating 2,880 observations. The participants were drawn from a list of people who had expressed interest in participating in lab experiments at the University of Tennessee, the vast majority of whom were U. Tennessee students. We provided informed consent sheets, ensured all responses were confidential, and walked

participants through two clearly-defined practice rounds. The experimental design using human subjects was approved by U. Tennessee's Institutional Review Board (application reference IRB-17-037760-XP).

The participants were told two randomly-selected rounds would count for real, and payoffs would be based on these rounds. Total compensation to the participants was a flat fee for their time plus their earnings from the randomly selected rounds. The game was played for real money, and money the participants chose to donate was actually given to our partner charity.

Participants were issued tokens, drawn randomly from uniform intervals, and converted to real money at the end of the experiment. Endowments were confidential/anonymous, and purely random in one-half of our sessions. This generated an exogenous relative positioning. In the other half of our sessions, participants first engaged in an effort task that boosted the tokens of above-median performers. The pre-experiment effort task was the 'slider' task of Gill and Prowse (2012). This is a commonly used tool in economics lab experiments that allows participants to "earn" some reward via a manual labor task which involves precisely positioning a set of sliders under time pressure. In our experiment, above-median performers had their random endowment doubled, departing from the 'purely luck' treatment. As an empirical matter, the difference in results in effort and pure-luck treatments were not statistically significant, and so we do not emphasize the details of this treatment here; details are available in the appendix.

In addition to how many tokens they had personally received, participants were also told the minimum and maximum allocations given to others in every round, and shown a graphical representation of their relative position. This screen is depicted in Figure 1. We measure this relative position on a one-hundred point scale, which we call percentiles. This ensures a consistent measure of relative position across different rounds, endowments, match rates, etc. To measure curvature, we take the square of the percentile measure.

The principal research question that the experiment was designed to investigate is how relative economic position affects charitable giving. This was accomplished by assigning endowments across rounds at random, and then showing subjects how their random endowment in each round compared to other subjects' endowments in that round. The range of endowments varied across rounds, allowing us to compare decisions with very similar absolute economic positions but very different relative economic positions to tease out the difference between those two effects.

The experiment also allows for variation in "price" using a match rate treatment that varies randomly across rounds. This treatment simulates a confounding influence on giving present in both tax and survey data from the United States, where charitable donations are tax-deductible. Tax-deductibility lowers charitable donations' after-tax cost, discounting giving by an individual's marginal tax rate.[7] Because higher-income households face different marginal tax rates than lower-income households,[8] higher-income households face a lower after-tax price of donations than lower-income households.

We use donation matches of varying rates to experimentally change the after-match cost to the participant of making a contribution. These match rates are orthogonal to the other treatments. Along with participant absolute income and relative position, the match rate treatment allows researchers to think about how the price of giving affected giving decisions separately from changes in income, since the value of the charitable contribution tax deduction changes with income under the US tax system. This issue was a matter of significant concern for our partner charity, as our experiment was designed with their input during the US tax reforms of 2017.

A detailed presentation of the endowment distributions and match rates used across the rounds are included in table 1. The average endowment was 260 tokens, permitting quite precise contribution rates and avoiding integer problems. Participants donated 19% of their tokens on average, incentivized through high match rates of up to 10x. Match rates were exogenous to one's

individual allocation, and to the endowment distribution, so these treatments do not contaminate each other. More than 95% of participants made nonzero donations in at least one round. Full summary statistics are presented in table 2. The experimental data and replication files are posted for public download from OpenICPSR, and are also linked from the authors' professional web sites.[9]

An important feature of the experiment was the destination of the donations. We collaborated with a partner charity, the United Way of Greater Knoxville. Participants were provided with an outline of the charity's work ("many programs, ranging from delivering hot meals to elderly citizens, to providing job training to people with intellectual disabilities"), and we made copies of the annual report and promotional material available. The United Way of Greater Knoxville is the largest charity in the area, with an annual budget in excess of $6m.

4 Empirical Results

Our primary research question is how relative placement in an income distribution affects charitable giving. We present our results both graphically and in a standard regression table format. We start with the graphical presentation in the panels in Figure 2.[10] Following Neumayr and Pennerstorfer (2021), we present a wide variety of nonparametric and parametric models to confirm that the U-shape is not a product of researcher choices. In all cases the dependent variable is percent of endowment that is voluntarily contributed. Across a variety of methodological approaches, we present estimates for the share of tokens donated by endowment. All estimates use the complete data set, including contributions of zero.

We start with Figure 2a. This depicts three 'lowess' plots of the raw data with no controls. Lowess nonparametrically generates predicted values via locally-weighted regression estimates, applying greater weight to nearby observations. It is a relatively computationally intensive

procedure, performing a regression on every observation, and does not generate well-defined confidence intervals. The relationship for the complete dataset is the continuous (navy) line that is largely in the middle of the graph. There is a pronounced U-shape relationship between relative income and giving. The fraction of income donated is about 22% for the lowest income participants in the pooled data, dropping down to a low-point of approximately 18% near the median, before rising again towards 23% for the highest-income groups.

In addition to the pooled sample (continuous line), we test the robustness of this approach by separately estimating the lowess based on self-reported socioeconomic status. In a post-experiment questionnaire, participants were asked to self-report their socioeconomic status on a labeled five-point Likert scale. The dashed (green) line shows the lowess curve for those who self-identified as "Working-class" or "Lower-middle class." Similarly, the dash-dot (orange) line plots the relationship for those who self-identified as "Upper-middle class" or "Upper-class." While participants had no incentive to misreport their status, we do rely on honest revelation. All categories return a U-shape relationship. The curvature is more dramatic for those of higher SES.

As we have multiple observations from each individual, we can partial out individual-level fixed effects and compare results. That is depicted in Figure 2b where we implement the partially linear model of Robinson (1988). This approach linearly controls for the fixed effects and nonparametrically estimates the variable of interest. By subtracting individual level means, we estimate the relationship from changes in relative rank more directly. We plot a lowess curve of the predicted values. Relative to figure 2a, we see that accounting for individual FEs diminishes predicted values at the upper-most levels of relative position, but the figure retains the U-shape reasonably clearly.

Figure 2c, depicting the results from a quantile regression, takes a slightly more structured form. In particular, it plots the point estimates of a regression of percent donated on within-round income

decile. The U-shape is noticeable, and the omitted category is the fifth decile. Figure 2d shows the predicted values for each decile of the income distribution from a locally linear kernel regression. Unlike lowess curves, the kernel estimate bandwidth is chosen optimally by an algorithm to minimize the integrated mean squared error of the prediction. There is some additional nonlinearity observed in this figure, resembling a 'W' more than a 'U'. This internal peak is relatively small compared to the overall range, and not statistically significant.

Figure 2e depicts the predicted values of a quadratic relationship, namely an OLS regression of the form $y = \beta_1 x + \beta_2 x^2$. We note this parametric form fits the pooled sample in Figure 2a quite well. However, a regression on just x and x^2 is an ad hoc assumption that can be generalized to include e.g. $x^{\frac{1}{2}}$. Figure 2f depicts a fractional polynomial regression that plots the 'best'-fitting curve from searching through several dozen combinations of potential exponents. The results are condensed at the initial extremity of the graph, though the U-shape perseveres.

Figure 2 demonstrates a U-shaped curvature in a variety of parametric and nonparametric specifications. Our remaining analyses confirm that this robust pattern is not due to the spurious influences on giving behavior. First, we double-check that the U-shaped behavior we observe is not driven by a handful of outliers, as the previous literature has suggested is the cause of the U-shape in tax and survey data (Meer and Priday 2020). Figure B1 in the Online Appendix reproduces Figure 2 but omitting 'outliers', people whose average donation exceeds 50%. This coincides with the ninetieth percentile of generosity. Omission of these participants does not change the consistent U-shape pattern established in figure 2f.

As a second check, we present parametric estimates of the U-shaped relationship using multivariate regression analysis controlling for additional variables. Because income percentile is assigned at random, it should not be necessary to control for other factors to establish an unbiased

causal estimate. But to confirm that randomization was successful, we present multivariate alternatives with control variables in table 3. Our control variables are self-reported demographic and educational variables collected at the end of the experiment. All were self-reported by the participants. Demographic controls are age, gender, marital status, and socioeconomic status (SES). Additional controls include whether it was the participant's first experiment, how well they thought they were compensated for their time, how well they felt they understood the experiment, and number of economics courses taken.

The dependent variable in Table 3 remains the share of income that is donated. We capture the nonlinear (i.e. U-shaped) relationship between relative position and giving by including both 'Percentile' and 'Percentile squared' terms. In this approach we are implicitly testing for a quadratic equation, with a negative linear coefficient and a positive coefficient on the squared term.[11] This specification lends itself to one-sided hypothesis testing and the reduced inferential burden that imposes. Our use of two-sided testing thresholds is thus conservative. We use asterisks to mark conventional frequentist testing thresholds ($p < 0.1$, 0.05, and 0.01) for the hypothesis that the reported coefficient is different from zero.

We present six specifications under three categories. The first category is simple OLS without addressing the panel nature of the data; the second category incorporates individual fixed effects which capture all time-invariant characteristics of the participants; and the third category is a random effects model which, being the most efficient approach, is our preferred specification. We include the pooled OLS results, which give qualitatively similar point estimates to the more efficient panel data estimators, for transparency. The fixed effects and random effects point estimates will cohere in experimental settings where treatment is successfully randomized. All categories include an additional set of results incorporating effort task interaction effects.

The principal finding from Table 3 is substantial statistical evidence supporting the U-shape giving curve. This is not altogether surprising given the evidence depicted in Figure 2. All coefficients in the top row, the effect of relative placement, are negative, and the effect of placement squared, in the second row, is consistently positive; that is, all six specifications have a decreasing-then-increasing shape consistent with a U in giving/income. Once we account for the panel nature of the data using fixed effects or random effects, these coefficients are remarkably similar in magnitude. The consistency between the fixed and random effects coefficients is evidence supporting the exogeneity condition needed for the random effects estimates to be consistent. Despite mechanical multicollinearity, both coefficients are statistically significant at the 99% level when using the more efficient random effects estimator (columns 5 and 6).

We include the results of our match and inequality treatments in Table 3. Though they are not the main objects of attention in this paper, their effects may be of interest. We see that increasing a match rate (e.g. from 2 to 3) increases contributions as a fraction of endowment by about 0.7 percentage points. Similarly, increasing the extent of inequality, as measured by the difference between the highest and lowest endowments, decreases giving. These findings are studied in much greater detail in Duquette and Hargaden (2021).

Finally, the bottom four (indented) rows of variables measure interaction effects for the effort task. This measures whether the treatment effects noted above significantly differ between our purely luck and effort reward sessions. We do not find statistically significant differences. Of the twelve coefficients, only one is significant at a conventional level. Nonetheless, the results relating to the U-shape are suggestive of a muted response in the effort reward sessions. As with all interaction effects, the coefficients are interpreted relative to the base category. All six coefficients (three on Percentile, and three on Percentile Squared) push the base category towards zero. While

not statistically different, this does suggest the U-shape curvature may be stronger in the purely random allocation rounds.

5 Conclusion

The U-shaped charitable giving curve is further empirical evidence of important nonlinearities, and indeed non-monotonicities, in how socioeconomic structure can affect decision-making. Nonetheless, there persists a skepticism from some scholars to accept the veracity of the relationship based solely on correlational evidence. To be clear, there may be reasons why the skepticism is warranted. Correlational results can be spurious. Progressive tax systems generate endogeneity concerns, and aggregate goods like "tax-deductible donations" can mask important differences in composition. The empirical literature on the U-shape giving curve has lacked causal evidence.

We overcome these concerns by conducting a charitable giving experiment in the lab. In our experiment, we alter one specific component — the relative endowment of participants — and find this has a clear statistical effect on behavior. Repeating the experiment over multiple rounds facilitates the inclusion of person fixed effects, allowing us to control for any time-invariant factors participants bring with them into the lab. By randomizing placement in the within-lab income distribution, and making their placement salient, we demonstrate that relative position in an economic distribution itself has a causal effect on economic decisions. The U-shape giving curve is replicated in our experimental data, under a battery of specifications. With all other explanations of the U-curve either excluded by the lab setup or equalized by randomization, the only plausible inference is that the U-shape really does describe a causal influence of economic position on generosity at the mean.

One limitation of our approach is that lab experiments are internally but not externally valid. That is, we cannot conclude definitively that the U-shape we observe in our experiment is the same as the one that has been observed in naturally occurring data; it is not logically impossible that the giving-income U-shape curve could be valid in our experimental setting *and* a data artefact in tax return data. However, we do view our results as suggesting that a true nonlinear behavioral effect should be taken more seriously as the reason we do see a U in tax return and survey data files.

Because these data were generated during an experiment with a different research question, we are also limited in our ability to describe how U-shaped giving varies across individuals, or to make sophisticated conjectures about where the U comes from. The fact that we observe very different convexities in the average U-shape by self-reported SES (figure 2a) suggests that there may be important influences of social status on the curvature of the giving/income curve. However, because of the presence of other experimental treatments in the data, we cannot estimate individual-level U-convexities, nor can we say much about social correlates or psychological mechanisms that lead to U-shaped donation decisions in our experimental framework. Future experiments designed to illuminate these questions could help with more informed conjecture about why we see a U-shaped pattern in observational data too.

Disclosures

The authors have no financial arrangements that might give rise to conflicts of interest with respect to the research reported in this paper.

Notes

[1] To be clear, McClelland and Brooks find a sharply declining giving/income ratio when income is measured using current income, but they do not find an offsetting increase among high incomes (a sideways J, not a U, shape). The decline from low to middle incomes is much more gradual, but the overall curve more clearly U-shaped, when they

use permanent income instead of current income. This raises the intriguing possibility that *both* spurious measurement or data issues could be affecting the reported distribution, *and* that the underlying curve is nevertheless U-shaped.

[2] For discussions of the "luxury good" interpretation of giving by people of high socioeconomic status, the interested reader might consider perspectives from theoretical economics, nonprofit studies, and empirical history in Bergstrom, Blume and Varian (1986), Evans, Evans and Mayo (2017), or Hargaden (2022) respectively.

[3] Aside from the positive questions scholars investigate about how people of different incomes give, the question is also of significant normative importance to society; consider the ongoing debates about the size and value of billionaire philanthropy, or the Biblical parable of the poor widow (Luke 21:1–4) that compares small donations by the poor to large donations by the rich.

[4] Schervish and Havens (2001) argue that the CEX data do not show this, but James and Sharpe (2007) document methodological disputes. Neumayr and Pennerstorfer (2021) argue that such methodological decisions are often key determinants of research findings on this topic.

[5] The PSID began as a study of low-income households in the 1960s, and so high-income households were neither its research focus nor an easy population to reach. Disproportionately many of the high-income households the PSID does observe are descended from people in the much earlier PSID waves who were not at that time high-income.

[6] The results detailed in this paper were obtained during the same experimental sessions as Duquette and Hargaden (2021). That paper investigates the effects of inequality per se on total giving, rather than the more subtle question of relative positioning/U-shape as discussed here.

[7] Many other countries also provide a tax subsidy for charitable giving, but not all do so in the form of a deduction. Because the US subsidy is structured as a reduction of income subject to a progressive tax rate schedule, this means that the marginal subsidy is more generous at higher incomes, which pay (and deduct against) higher rates. This may be one reason why the U-shape giving/income curve is upward-bending at higher incomes in the US but not other countries. For an international comparison of tax subsidies for charitable contributions, see OECD (2020).

[8] Higher-income households are also more likely to itemize deductions, a necessary condition for claiming a charitable-giving deduction.

[9] The OpenICPSR repository can be accessed at https://doi.org/10.3886/E191641V2. Enda Hargaden's professional web site is at http://www.hargaden.com/enda/. Nicolas Duquette's professional web site is at http://www.nicolasduquette.com.

[10] Two of curves plotted in figure 2 are identical to figures reported in the appendix to Duquette and Hargaden (2021), with some minor revisions. These two are the "pooled" curve in figure 2a, and the quantile regression plot in figure 2c. The other six fitted lines reported in figure 2, as well as the four regressions reported in table 1 and the various checks reported in our online appendix to this manuscript, are new to this manuscript and have not previously published. All panels of figure 2 have distinct scales on the vertical axes, optimized to show the variation within the panel rather than make visualizations directly comparable across panels.

[11] We note that a quadratic relationship is not a perfect test of a U-shape relationship. A quadratic form imposes symmetry and has a unique minimum at one point, and we know of no reason why U-shape relationships strictly require either of these conditions. Nonetheless, quadratics are the standard parametric forms used to test for U-shapes (e.g. James and Sharpe 2007), and we follow that practice.

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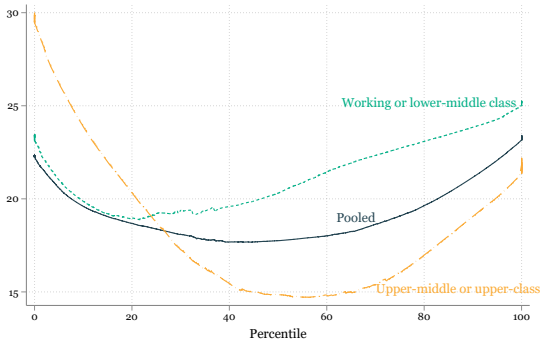
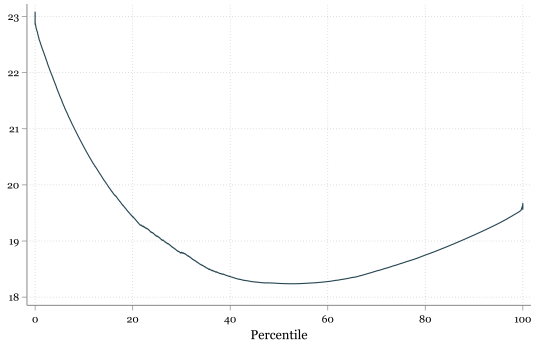
Figure 1: Primary experimental screen

Figure 2: The relationship between percent contribution and relative income across several specifications

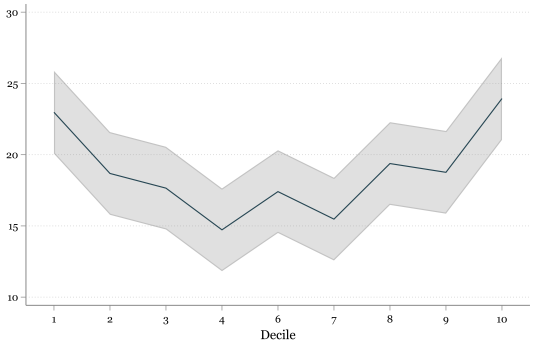
(a) Nonparametric (lowess) relationship, raw data



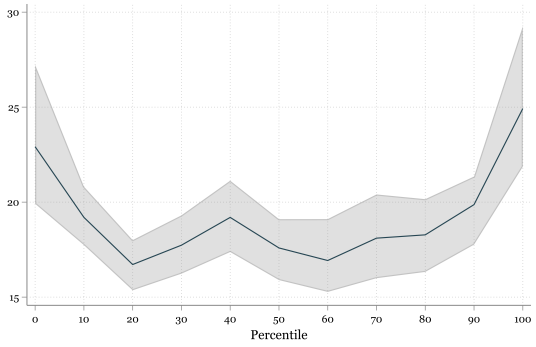
(b) Partially linear relationship, with participant FE



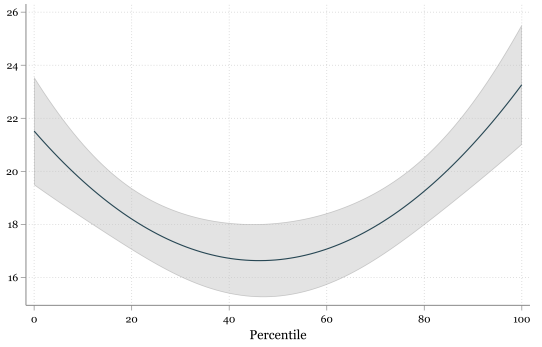
(c) Quantile regression



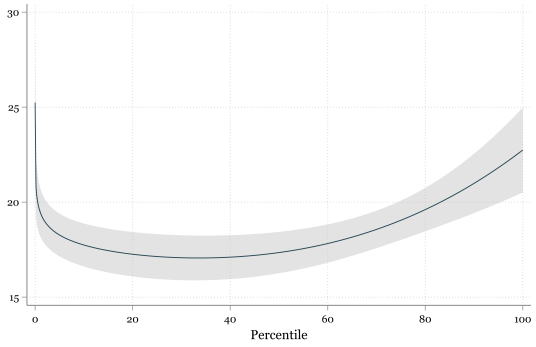
(d) Nonparametric kernel regression



(e) Quadratic specification



(f) Fractional polynomial regression



Notes: Figure 2a plots three lowess curves of the raw data, by self-reported socioeconomic status of participants. There are no adjustments for control variables in this figure. SES was measured on a five-point Likert scale. The two class-specific plots merge lower self-identification (Working or Lower-middle) groups and two higher self-identification (Upper-middle or Upper) groups, and nonparametrically plot the empirical relationships within these groups separately. The solid line is the lowess curve for all groups pooled. Lowess estimation, a computationally intensive procedure that performs a regression on every observation, does not generate standard errors or confidence intervals. Figure 2b depicts a partially linear model (Robinson 1988), residualized from individual fixed effects. Figure 2c plots the point estimates and 95% CIs from a quantile regression on ten bins (i.e. deciles) of relative income. The omitted category is the fifth decile. Figure 2d depicts the conditional mean across the distribution, as predicted by a local kernel regression. Figure 2e plots the predicted values generated by a quadratic $y = \beta_1 x + \beta_2 x^2$ OLS specification. Figure 2f plots the predicted values generated by a fractional polynomial regression. This approach is similar to a quadratic, but does not constrain the exponent to a square term. The range of vertical axes varies across panels and is optimized for the easy viewing of the variation in the results reported in each panel separately.

Table 1: Complete list of allocation distributions and match rates

Round Number	Endowment distribution	Match rates
1 & 2	U[50, 300]	1, 5
3 & 4	U[0, 1000]	2, 0
5 & 6	U[200, 500]	2, 8
7 & 8	U[200, 800]	1, 6
9 & 10	U[100, 400]	10, 5
11 & 12	U[0, 200]	0, 6
13 & 14	U[0, 300]	2, 3
15 & 16	U[100, 200]	0, 3
17 & 18	U[100, 500]	1, 2
19 & 20	U[100, 300]	4, 2
21 & 22	U[50, 500]	0, 1
23 & 24	U[0, 200]	4, 1

Table 2: Summary statistics of Philanthropy Experiment

	Mean	Std. Dev	N	Min	Max
Session ID	3.27	1.73	2,880	1	6
Person ID	60.50	34.65	2,880	1	120
Experimental Period	12.50	6.92	2,880	1	24
Endowment (tokens)	260.12	183.17	2,880	2	998
Match rate	2.72	2.42	2,880	0	10
Ever Contribute	0.99	0.09	2,880	0	1
Contribution (tokens)	48.62	82.36	2,880	0	850
Contribution, % of tokens	19.07	24.29	2,880	0	100
Log of contributions	3.40	1.77	2,880	0	7
Distance to Highest Endowment	187.71	178.94	2,880	0	987
Distance to Lowest Endowment	155.96	160.88	2,880	0	987
Age	20.72	1.99	2,880	18	32
Male	0.57	0.50	2,880	0	1
Married	0.02	0.13	2,880	0	1
First experiment	0.38	0.48	2,880	0	1
Social Class (1-5 scale)	2.93	1.01	2,880	1	5
Well compensated (1-5 scale)	4.23	0.92	2,880	1	5
Understand experiment (1-5 scale)	4.35	0.90	2,880	1	5
Exchange rate (USD/tokens)	0.04	0.01	2,880	0.03	0.05
Economics courses taken	1.77	2.05	2,880	0	12

Table 3: Effect of treatments on percent of endowment donated

	Pooled OLS		Fixed Effects		Random Effects	
	(1)	(2)	(3)	(4)	(5)	(6)
Percentile	-0.083	-0.14*	-0.16*	-0.21*	-0.16***	-0.20***
	(0.088)	(0.065)	(0.068)	(0.096)	(0.031)	(0.040)
Percentile squared	0.14*	0.20**	0.13**	0.16*	0.13***	0.15***
	(0.064)	(0.068)	(0.045)	(0.072)	(0.030)	(0.040)
Match rate	0.72**	0.71**	0.74**	0.62	0.74***	0.64***
	(0.25)	(0.24)	(0.25)	(0.31)	(0.10)	(0.13)
Extent of inequality	-0.59**	-0.27	-0.58***	-0.50***	-0.58***	-0.46***
	(0.16)	(0.20)	(0.12)	(0.12)	(0.12)	(0.15)
Percentile × *Effort Task*		0.10		0.15		0.12**
		(0.091)		(0.100)		(0.060)
Percentile squared × *Effort Task*		-0.11		-0.072		-0.053
		(0.098)		(0.075)		(0.058)
Match Rate × *Effort Task*		0.047		0.38		0.31
		(0.39)		(0.51)		(0.22)
Inequality × *Effort Task*		-0.75		-0.20		-0.32
		(0.49)		(0.26)		(0.24)
Control variables	Yes	Yes	No	No	Yes	Yes
Joint significance p-value	0.107	0.007	0.017	0.026	0.000	0.000
Within R-squared	0.15	0.15	0.04	0.05	0.04	0.05
N	2,880	2,880	2,880	2,880	2,880	2,880

Table shows the results of relative income level (Percentile) and curvature (Percentile squared) on giving, with and without interactions for the Effort Task treatment. The Percentile-squared and Extent of inequality coefficients have been multiplied by 100 for ease of comparison. The Pooled OLS and Fixed Effect specifications are clustered at the individual level. The joint significant p-value reports the significance of an F-test that coefficients for the Percentile, Percentile-squared and any interaction terms for the two in the specification are zero. "Control variables" include self-reported age, gender, marital status, socioeconomic status, whether it was the participant's first experiment, how well they thought they were compensated for their time, how well they felt they understood the experiment, and number of economics courses the participant had taken. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.