The U-Shaped Charitable-Giving Curve

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Abstract

Low- and high-income households donate higher fractions of income to charity than the middle-class: the giving curve is U-shaped. Though well-documented in correlational studies, it may be a by-product of unobservables or other statistical quirks. Partnering with a real charity, we conduct a charitable-giving experiment where relative endowments are revealed to participants. We experimentally verify the U-shaped charitable-giving curve. Economic status influences giving decisions in nonlinear ways not well-explained by standard theories.

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

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1 Introduction

The fraction of income Americans donate to charity follows 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, *why* giving should follow this pattern remains a puzzle (List 2011).[1] The literature has suggested that the U-shape might arise 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 (Auten, Clotfelter and Schmalbeck 2000), or because low-income means are influenced by positive outliers with unobserved high wealth or permanent income (McClelland and Brooks 2004; James and Sharpe 2007; Meer and Priday 2020).[2]

In this paper, we show for the first time that the giving curve is a *causal relationship*. That is, one's relative placement in the income distribution causes a U-shaped charitable-giving curve, and changes in the 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 is clearly evident across a variety of specifications: in the raw data; across 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 match rates for contributions and income distributions. We do not find significantly different patterns when endowments are purely random versus partly earned through an effort-rewarding task.

Economists' preferences for credible identification has engendered skepticism of the U-shape giving curve, generated statistical critiques, and questioned its veracity. The design of our experiment means the

[1] The U-shape has been replicated many times using various sources of data (cf. Clotfelter 1980; Clotfelter and Steuerle 1981; Clotfelter 1985; Andreoni 2006).

[2] The giving-income gradient in non-US data often finds a consistent negative gradient rather than a U-shape (Breeze 2006; Wiepking 2007; Benediktson 2018); the puzzle of why low-income households give higher shares of their income is also observed in UK, Dutch, and Danish data as well as the US. As a robustness check to outliers, we replicate the U-shape relationship excluding the top ten percent of givers.

standard observational data-based critiques are inapplicable. Donations are truthful and recorded without measurement error. Because relative 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 should be at least contemplated as the direct, casual effect 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.

Plotting the share of household expenditure on particular goods as a function of income is most closely associated with Ernst Engel (1895). Originally used to study the budget share on food (Chai and Moneta 2010), an enormous academic literature (e.g. Prais 1952; Houthakker and Taylor 1970; Banks, Blundell and Lewbel 1997; Blundell, Chen and Kristensen 2007) derives from Engel curves and budget shares. This paper can be viewed in this vein, focusing on credible identification of an Engel curve for charitable giving.

How relative placement or rank affects pro-social behavior like charitable giving is of interest to social scientists more broadly.[3] Homotheticity, and the degree of homogeneity exhibited by preferences, are foundational elements of consumer theory. These properties are crucial to understanding consumer aggregation, excess demand functions, comparative statics, any many other core topics.[4] The homotheticity (or otherwise) of charitable giving is one special case, and the extent to which changes in income may shape pro-social behaviors like charitable giving is of interest to psychologists as well as economists. Social psychologists, for example Piff, Kraus, Côté, Cheng and Keltner (2010), present evidence that lower-income households are more charitable and compassionate to cope with problems they cannot solve through their individual resources.

Clotfelter and Steuerle (1981) is the first paper to our knowledge to document the U-shape charitable-giving Engle curve. Follow-up work, Clotfelter (1985), confirms the U-shapes in 1950, '60 and '70, and

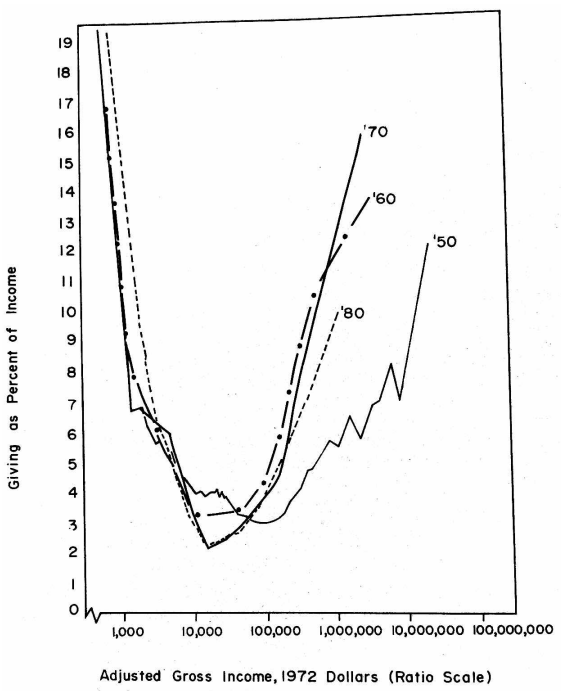
[3]This question of relative versus absolute contribution to charity is ancient. Beyond Engels, the Biblical parable of the poor widow (Luke 21:1–4) compares small donations by the poor to large donations by the rich.

[4]Gorman (1953) shows aggregate demands permit a representative consumer interpretation iff Engel curves are linear. The quasi-homothetic utility function of Geary (1950), which is homothetic above some subsistence level γ, has the same mathematical form as the Nash bargaining solution with γ representing outside options (Neary 1997). Engel curve-type analysis has been used empirically to estimate topics as disparate as self-employed tax evasion (Feldman and Slemrod 2007) and inflation in China (Nakamura, Steinsson and Liu 2016).

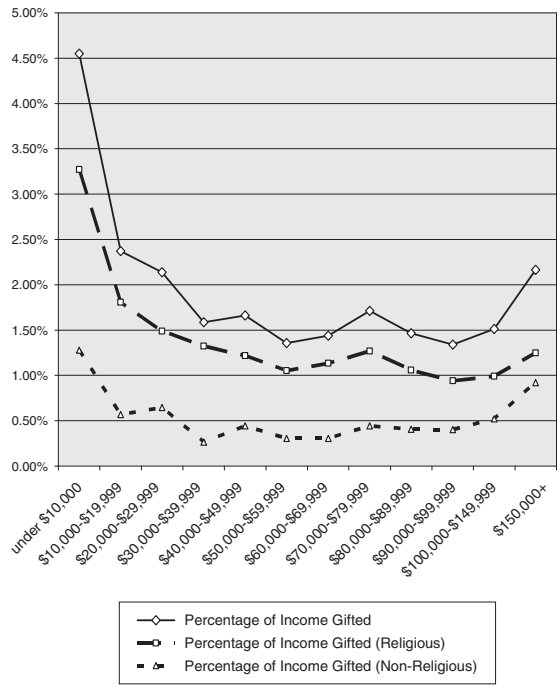
'80 individual income tax return data, which we reproduce in Figure 1a. Auten et al. (2000) generate the U-shape for tax return data for 1991–95 and suggest that it is driven by high religiosity at the low end and secular giving at the high end.

Figure 1: Published Examples of Giving-Income U-Curve

(a) Tax data curve from Clotfelter (1985)



(b) Survey data curve from James and Sharpe (2007)



Notes: Figure 1a is reproduced from Clotfelter 1985 Figure 2.1, page 20, titled "Giving as a percentage of income by income, selected years." Figure 1b is James and Sharpe's Figure 1, titled "The U: Percentage of Income Gifted in Each Income Increment (Consumer Expenditure Survey 1998-2001)"
Sources: Clotfelter (1985), James and Sharpe (2007)

List (2011) also notes poor households' tendency to give to religious causes as one explanation for their relatively higher giving. There are good reasons to categorize donations to religious groups as distinct from pure public good contributions. For one, religious activities are excludable to non-members. Tax-deductible charitable giving includes both religious contributions and contributions to the pure public good. While individuals' tax returns provide voluminous statistical power, they conflate pure public good donations from club good or religious donations. This is a limitation of tax data. Our focus on donations to a real-world charity avoids this compositional ambiguity, and we believe is an attractive feature of our experiment.

By using data from the Consumer Expenditure (CEX) Survey to reproduce the U-curve, James and Sharpe (2007) circumvent the tax return composition problem. The CEX data disentangle religious giving

from secular charitable giving. As shown in Figure 1b, James and Sharpe (2007) verify the U-shape in *both* categories of 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.[5]

While survey data can disentangle religious donations from other charitable donations, it too comes with a confounder generated by the tax system. Charitable donations are tax-deductible. This tax-advantaged status of charitable donations lowers their after-tax cost, in effect discounting it by an individual's marginal tax rate. Because higher-income households face different marginal tax rates than lower-income households,[6] higher-income households face a different (i.e. lower) after-tax price of donations. This after-tax price difference acts as an omitted variable, and it means even households with identical preferences would have different giving rates. Any investigation of the U-shape relationship should ideally restrict outcomes to a single public good, and avoid endogenous marginal tax rates. This paper provides an experimental test of the U-shape hypothesis that is restricted to one public good contribution (donation to a reputable external charity) and without confounding tax treatments.

Economists have been reluctant to attribute much weight to the U-shape giving curve, perhaps in part because such behavior is difficult to rationalize with the prevailing models of voluntary contributions to a public good. However, an experimental economics literature has found nonlinear positional effects on pro-social behavior. Most notably, Erkal, Gangadharan and Nikiforakis (2011) shows a non-monotonic relationship between earnings and giving. They find participants who rank first in a four-player tournament are significantly less likely to contribute to within-lab redistribution than those who rank second. This is not identical to finding a U-shape, indeed the finding is closer to an inverted U-shape, but is strongly suggestive of behavioral effects of placement. Our paper adapts this work on two dimensions. 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.

[5] A series of papers by Schervish and Havens (1995, 1997, 1998, 2001) argues that the CEX data do not show this, but James and Sharpe (2007) document methodological disputes.

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

3 Experimental Design

To identify the effect of relative income on charitable-giving, we conducted a lab experiment at the University of Tennessee's Experimental Economics Lab in September 2017.[7] One-hundred and twenty participants played a donation game over 24 rounds, generating 2,880 observations. The participants were told two randomly-selected rounds would count for real, and payoffs would be based on these rounds. We provided informed consent sheets, ensured all responses were confidential, and walked participants through two clearly-defined practice rounds.

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 sessions, participants first engaged in an effort task that boosted the tokens of above-median performers.[8] 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 a graphical representation of their relative position. This screen is depicted graphically in Figure 2. 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.

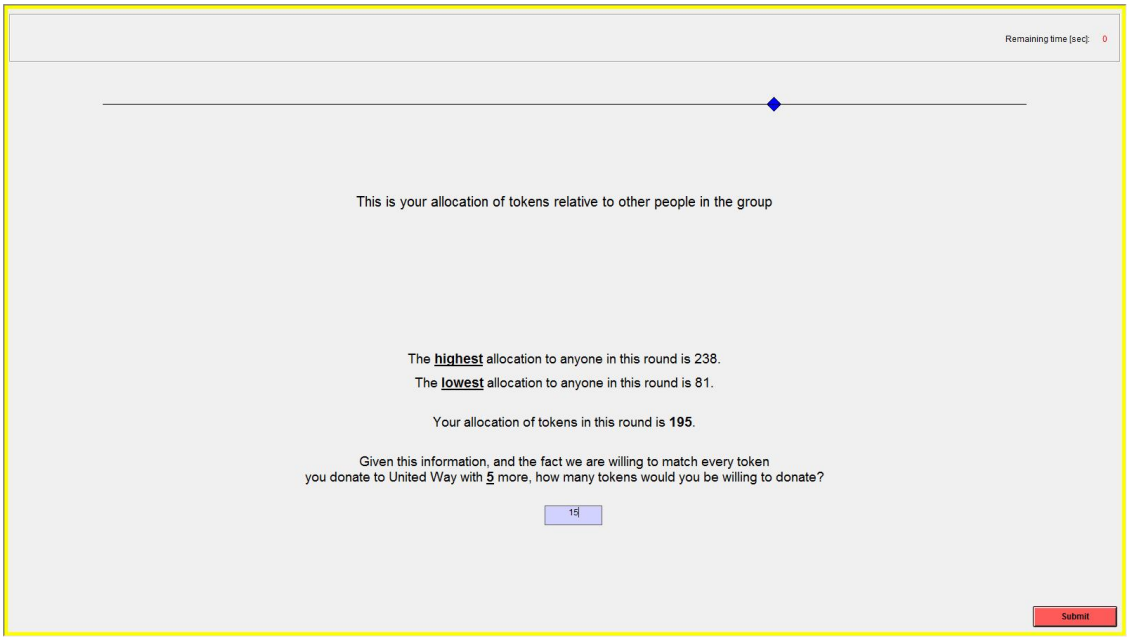
The principal research question is how relative position affects charitable giving. To incentivize donations, we supplemented participant donations with a randomly allocated matching amount. Full details on the endowment distributions and match rates are included in the appendix. The average endowment 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 included in the appendix.

An important feature of the experiment was the destination of the donations. We collaborated with a

[7] The results detailed in this paper were obtained during the same experimental sessions as Duquette and Hargaden (2020). 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.

[8] The pre-experiment effort task was the 'slider' task of Gill and Prowse (2012). This is a manual labor task which involves precisely positioning a set of sliders under time pressure. Above-median performers had their random endowment doubled, departing from the 'purely luck' treatments. 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 in the main paper. Details are available in the appendix.

Figure 2: Primary experimental screen



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. United Way is the largest charity in the area, with an annual budget in excess of $6m. We believe an external charity is a reasonable approximation to the theoretical ideal of the public good.

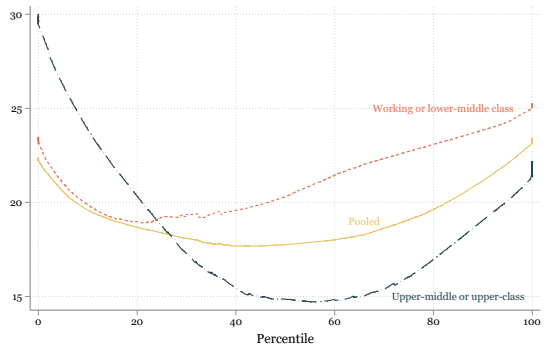
4 Empirical Results

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 3.

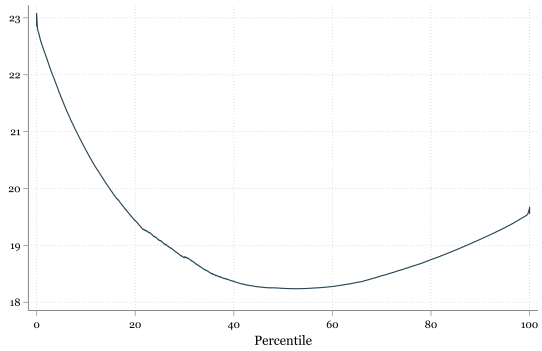
In all cases the dependent variable is percent of endowment that is voluntarily contributed. We start with Figure 3a. This depicts three 'lowess' plots of the raw data with no controls. Lowess generates predicted values via locally-weighted regression estimates, applying greater weight to nearby observations. 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 con-

Figure 3: The relationship between percent contribution and relative income across several specifications

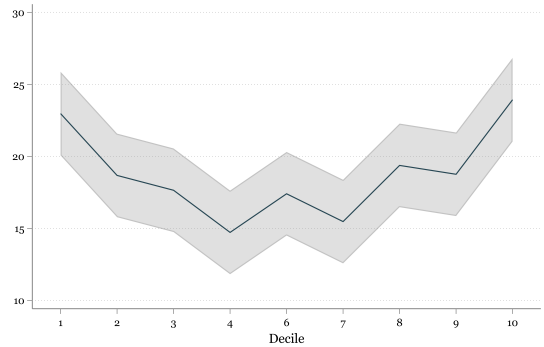
(a) Nonparametric (lowess) relationship, raw data



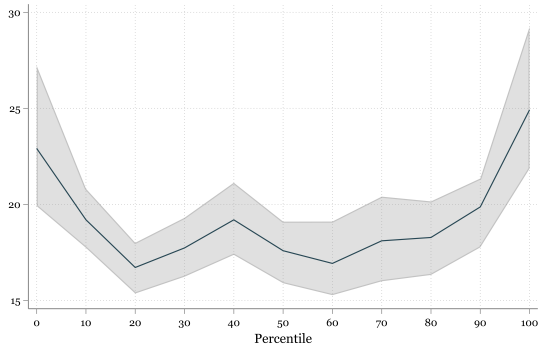
(b) Partially linear relationship, with participant FE



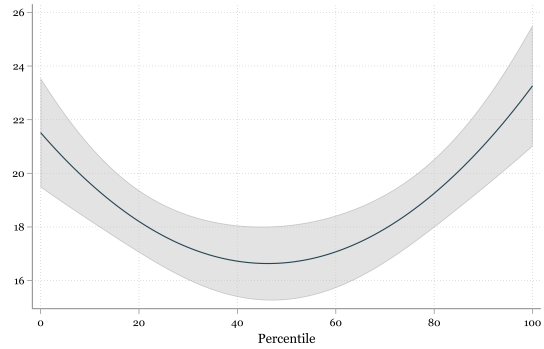
(c) Quantile regression



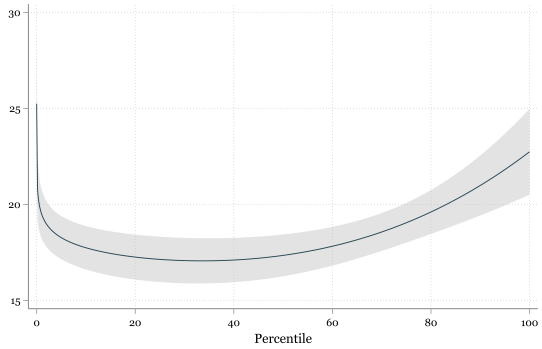
(d) Nonparametric kernel regression



(e) Quadratic specification



(f) Fractional polynomial regression



Notes: Figure 3a 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 3b depicts a partially linear model (Robinson 1988), residualized from individual fixed effects. Figure 3c 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 3d depicts the conditional mean across the distribution, as predicted by a local kernel regression. Figure 3e plots the predicted values generated by a quadratic $y = \beta_1 x + \beta_2 x^2$ OLS specification. Figure 3f 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.

tinuous (yellow) 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 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 (orange) line shows the lowess curve for those who self-identified as "Working-class" or "Lower-middle class". Similarly the dash-dot (navy) 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 three 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 3b 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 3a, 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 3c, 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 3d 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 3e 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 3a 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 3f

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.

While Figure 3 depicts the U-shaped curvature in a variety of specifications, it makes controlling for other treatments computationally difficult.[9] For that, we switch to regression analysis, the results of which are depicted in the Table 1 below.

Table 1: 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	0.054	0.017	0.152	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 Efort 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 level and curvature of placement are zero. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

The dependent variable in Table 1 remains the share of income that is donated. We capture the non-

[9] Figure 4 in the Appendix reproduces Figure 3 but omitting 'outliers', people whose average donation exceeds 50%. This coincides with the ninetieth percentile of generosity.

linear (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.[10] This specification lends itself to one-sided hypothesis and the reduced inferential burden that imposes. Our use of two-sided testing thresholds is thus conservative.

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 estimator which we expect is the most efficient approach. 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 1 is substantial statistical evidence supporting the U-shape giving curve. This is not altogether surprising given the evidence depicted in Figure 3. All coefficients in the top row, the effect of relative placement, are negative. Once we account for the panel nature of the data, the coefficients are remarkably similar. The consistency between the fixed and random effects coefficients is evidence supporting the exogeneity condition needed for the random effects estimates to be consistent. Looking at columns 5 and 6, the effects are significant at the 99% level. We reach similar conclusions with respect to curvature, the Percentile squared term. The coefficients are positive, reflecting a U-shape rather than inverted U-shape. The point estimates are very similar across specifications, and significant at the 99% level when using the efficient estimator.

We include the results of our match and inequality treatments in Table 1. 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 contribution, decreases giving.[11]

Finally, the bottom four (indented) rows of variables measure interaction effects for the effort task. This

[10] 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.

[11] These findings are studied in much greater detail in Duquette and Hargaden (2020).

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 is strongest in the purely random allocation rounds. Stated differently, the Engle curve for charitable giving is closer to a straight line for the effort-reward sessions.

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 economists 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 endogneity 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 the 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.

Finally we note suggestive evidence, though statistically insignificant, that results may differ by allocation mechanism. In addition to our broader experiment outlined above, we also ran sessions that

differentiated earnings based on random draw or based on pre-allocation effort. Though the U-shape relationship persists, the signs of the interaction terms tend to move the curvature towards zero. This implies the U-shaped relationship is stronger with randomly allocated 'house money' than in the effort sessions. While we repeat that we do not observe statistically significant differences across luck and effort sessions, we interpret the evidence as consistent with (Erkal et al. 2011) that high-performing participants become less redistributive in nature. This presents an avenue for future research assessing whether charitable donations are motivated by notions of warm glow or sense of unjust allocations.

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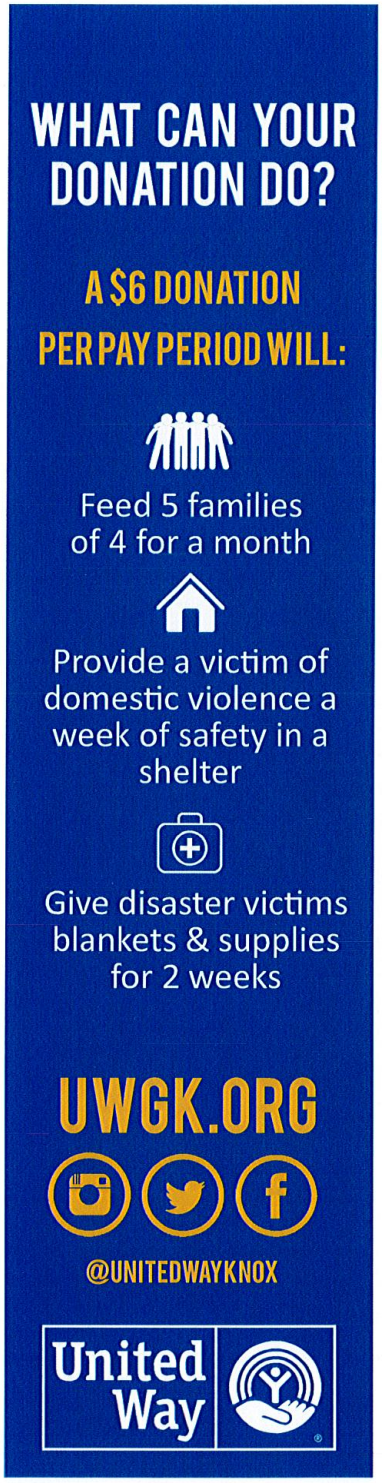
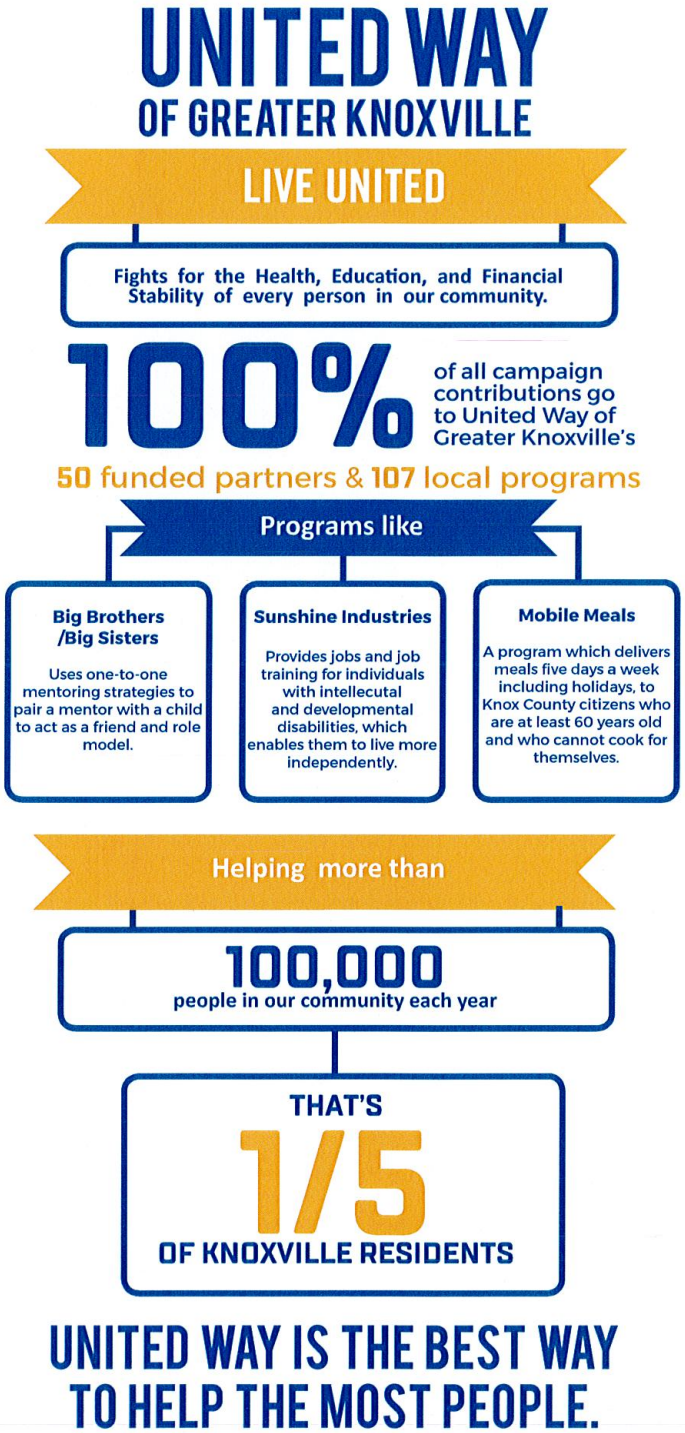
Appendices For Online Publication Only

A Experimental Procedure and Sample Documents

A.1 Additional Informational Materials





1301 Hannah Avenue
Knoxville, TN 37921
865-523-9131
865-522-7312 fax
www.uwgk.org

United Way
United Way
of Greater Knoxville

Dear UT Experimental Economics Participant,

The purpose of this notice is to confirm that United Way of Greater Knoxville is an official partner in the study you are about to participate in. We are working with Prof Hargaden on this experiment. We have provided feedback on the wording of the questions to be asked. We assure you that this study has our support, and that any donations participants make are indeed real donations. If you would like to learn more about our work, we have provided Prof Hargaden with informational materials which you are welcome to view.

In addition to securing some additional funds for activities, this laboratory experiment will provide scientific evidence on people's perceptions about charitable giving. We thank you for participating in this research project.

Yours sincerely,

Ben Landers

Ben Landers
President & CEO of United Way of Greater Knoxville

LIVE UNITED™

A.2 Informed Consent Document

Informed-Informational Document about Research

You are being asked to participate in the research project described below. Your participation in this study is entirely voluntary and you may refuse to participate, or you may decide to stop your participation at any time. Should you refuse to participate in the study or should you withdraw your consent and stop participation in the study, your decision will involve no penalty or loss of benefits to which you may be otherwise entitled. You are being asked to read the information below carefully, and ask questions about anything you don't understand before deciding whether or not to participate.

Title: Philanthropy Experiment 2017

Principal Investigator(s): Enda Patrick Hargaden, Ph.D.

PURPOSE OF THE STUDY

The purpose of this research is to examine how inequality and subsidies affect charitable-giving.

PROCEDURES

The research procedures are as follows: You will receive all the instructions describing your task and your payoffs from this task on your computer screen. All information is correct and true. Our research protocols specifically forbid us from providing incorrect or misleading information. You have the right to raise your hand and ask questions about the experiment protocols at any time. Your decisions will remain confidential and your choices will not be identified.

EXPECTED DURATION

The total anticipated time commitment will be approximately 60 minutes.

RISKS OF PARTICIPATION

There are no anticipated risks associated with participation in this project.

BENEFITS TO THE SUBJECT

There is no direct benefit received from your participation in this study, but your participation will help the investigator(s) better understand how economic institutions directly influence the decision making of its members.

CONFIDENTIALITY OF RECORDS

Every effort will be made to maintain the confidentiality of your study records. The data collected from the study will be used for educational and publication purposes, however, you will not be identified by name. For federal audit purposes, the participant's documentation for this research project will be maintained and safeguarded by Enda Hargaden for a minimum of three years after completion of the study. After that time, the participant's documentation may be destroyed.

FINANCIAL COMPENSATION

Your earnings are determined by the decisions you make in this experiment and are clearly explained in the instructions. At the end of the session, you will be paid privately and in cash.

INVESTIGATOR'S RIGHT TO WITHDRAW PARTICIPANT

The investigator has the right to withdraw you from this study at any time.

CONTACT INFORMATION FOR QUESTIONS OR PROBLEMS

The investigator has offered to answer all your questions. If you have additional questions during the course of this study about the research or any related problem, you may contact the Principal Investigator, Enda Hargaden, Ph.D., at phone number 865-974-8802 or by email at enda@utk.edu. If you have any questions about your rights as a research participant, you may also contact the Office of Compliance at phone number 865-974-7697 or by email at irb@utk.edu.

You have agreed to waive your signature on this form. Your voluntary participation is indicated by clicking the appropriate button on your screen to begin the experiment, and you may cease your participation at any time. In order to ensure anonymity of all respondents, please do not speak to those around you and direct any questions to the moderator by raising your hand. Such participation does not release the investigator(s), institution(s), sponsor(s) or granting agency(ies) from their professional and ethical responsibility to you.

A.3 Instructions

I welcome everyone to the UT Experimental Economics Laboratory. My name is _____ and joining me is _____. We are researchers from the Department of Economics. We understand that many of you have busy schedules and thus really appreciate your willingness to participate.

In this study you will be asked to make a series of market-like decisions. Know that there are no right and wrong decisions. However, your earnings in this experiment are based on the decisions you make. What these means is that not everyone will make the same amount, and that some decisions will lead to higher earnings than others.

The money you will be paid with comes from a research grant, and this money can only be used to pay experiment participants. You will be paid, in cash, after the experiment is completed.

In some cases, the decision-making setting may be unfamiliar to you. This is normal. In writing the instructions for this experiment, we have done our very best to clearly describe to you all relevant information from which to base your decisions. It is important for the integrity of this research that you understand the instructions and we encourage you to ask questions as we go through the instructions.

There are two important protocols in experimental economics that we would like you to be aware of. First, we are forbidden from using deception. What this means is that the instructions contain only true information. There are no hidden tasks and the experiment works exactly as stated in the instructions.

Second, your decisions are confidential. What this means is that you have been randomly assigned an ID number. All decisions you make will be associated with this ID number and not your name. Therefore, when we analyze the data and present results your name in no way will be affiliated with this study.

We have provided everyone with a pencil, calculator, and paper. Use these items, if you wish, as you make your decisions.

Has everyone had a chance to read the "Informed Consent Sheet"? Is everyone comfortable with the risks involved with participation in this experiment?

We will now proceed by going through the instructions together. Please listen carefully as I read the instructions aloud. Do not hesitate to stop me at any time to ask a question.

The purpose of this experiment is to research people's willingness to donate to charity. Our collaborating partner for this experiment is United Way of Greater Knoxville, one of the largest charities in our community. United Way funds many programs, ranging from delivering hot meals to elderly citizens, to providing job training to people with intellectual disabilities. I have here a confirmation letter from United Way and some copies of their Annual Report if anyone would like to know more about the organization.

In this experiment, the computer will allocate a number of tokens to each of you. In each round you will be told how many tokens you received, and some information on how many tokens other people in the experiment received. Tokens are worth money, and will be converted into cash at the end of the experiment. Each token is worth 5 cents, and so you can think of 100 tokens being worth 5 dollars.

You will be asked how many of these tokens you are willing to donate to United Way.

To incentivize donations, you will see on-screen that we will match any donations with a varying amount. For example, you might see "For every token you donate, we will match this with two more." This means United Way would receive three tokens in total for every one you donate. The amounts donated will remain confidential.

We will analyze how participants' donations depend on this information. We will run several rounds of this experiment. From these, the computer will select two to count for real, and payments will be based on those two rounds. At the end of the last session, you will be asked to fill out a questionnaire and paid for the tokens from the two selected rounds, in addition to the $5 show-up fee. Everybody will be paid in private after showing the record sheet. You are under no obligation to tell others how much you earned.

You are free to leave at any time and you will still receive the show-up fee.

[To determine how many tokens you receive, at the start of the game you will have to do a task. This is called the slider task. You will see many "sliders" on screen. These are scales that go from zero to one hundred. By using the mouse and/or the keyboard, you need to slide the pointer across and position it at exactly 50. The more of these you successfully position at 50, the higher your score, and the more tokens you will receive when we get to the experiment. We will do a practice round of this game, where you will have one minute to position as many slides as you can at exactly 50. This is just for practice, and will not count for real.]

We will first run two practice rounds to familiarize you with the experiment. These are for practice, and will not count for real.

B Additional Tables and Figures

Table 2: Complete list of allocation distributions and match rates

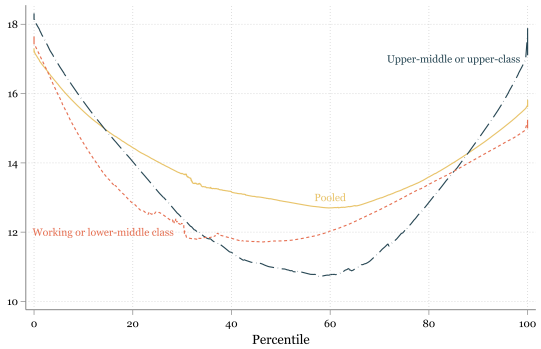
Round Number	Endowment distribution	Match rates
1 & 2	$U[50, 300]$	1, 5
3 & 4	$U[0, 1000]$	2, 0
5 & 6	$U[200, 500]$	2, 8
7 & 8	$U[200, 800]$	1, 6
9 & 10	$U[100, 400]$	10, 5
11 & 12	$U[0, 200]$	0, 6
13 & 14	$U[0, 300]$	2, 3
15 & 16	$U[100, 200]$	0, 3
17 & 18	$U[100, 500]$	1, 2
19 & 20	$U[100, 300]$	4,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

Table 3: Summary statistics of Philanthropy Experiment

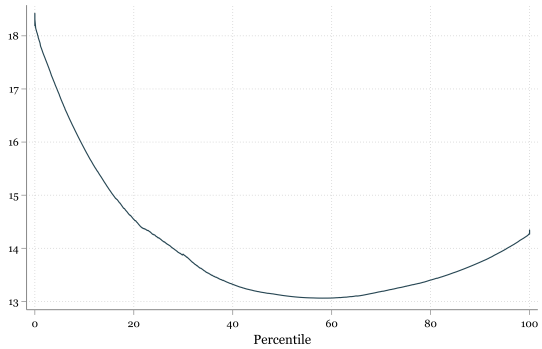
	Mean	Std. Dev	N	Min	Max
Session ID	3.27	1.73	2,880	1	6
Person ID	60.50	34.65	2,880	1	120
Experimental Period	12.50	6.92	2,880	1	24
Endowment (tokens)	260.12	183.17	2,880	2	998
Match rate	2.72	2.42	2,880	0	10
Contribution (tokens)	48.62	82.36	2,880	0	850
Contribution, % of tokens	19.07	24.29	2,880	0	100
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

Figure 4: The relationship between percent contribution and relative income, excluding the top 10 percent of contributors

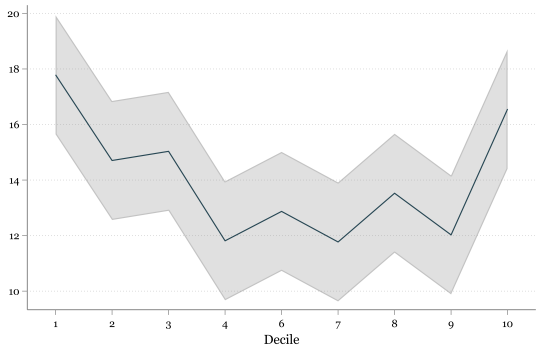
(a) Nonparametric (lowess) relationship, raw data



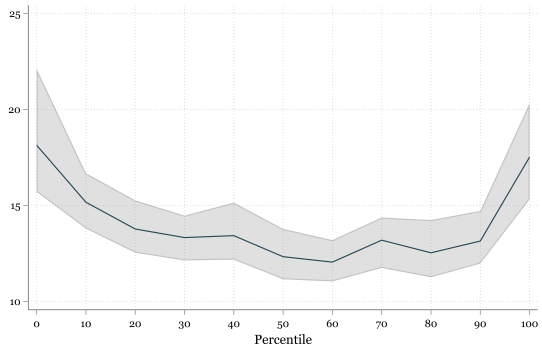
(b) Partially linear relationship, with participant FE



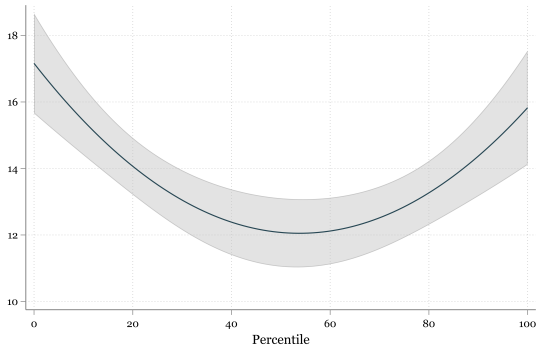
(c) Quantile regression



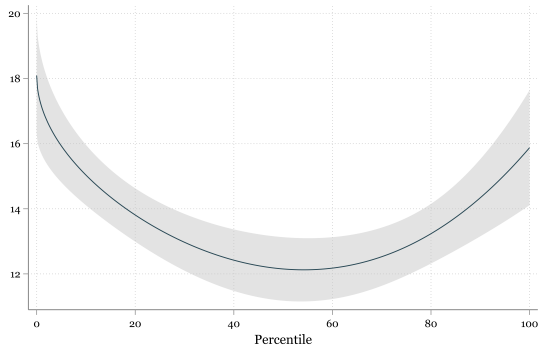
(d) Nonparametric kernel regression



(e) Quadratic specification



(f) Fractional polynomial regression



Notes: Figure 4a 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 4b depicts a partially linear model (Robinson 1988), residualized from individual fixed effects. Figure 4c 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 4d depicts the conditional mean across the distribution, as predicted by a local kernel regression. Figure 4e plots the predicted values generated by a quadratic $y = \beta_1 x + \beta_2 x^2$ OLS specification. Figure 4f 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.