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METHODOLOGY PAPER

Measuring strength of altruistic motives

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Abstract

We introduce a novel way to elicit individuals' strength of altruistic motivation in the context of charitable donations, ranging from pure warm glow to pure altruism. Using the giving-type elicitation task of Gangadharan et al. (2018) and assuming that individuals maximise a Cobb–Douglas impure altruism utility function, as is used in Ottoni-Wilhelm et al. (2017), we can uniquely identify the strength of altruistic motivation for impure altruists, which is typically found to be the largest category of donors. We compare the introduced measure to an alternative survey-based elicitation from Carpenter (2021).

Keywords Charitable giving · Generosity · Motivation · Warm glow · Altruism

JEL Classification C9 · D9 · H4

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1 Introduction

Understanding donor motives can help charity organisations and governments in designing fund-raising campaigns and supporting programmes. The two most prominent motivations discussed in the literature are warm glow and altruism. Whereas pure altruists derive utility from total donations (i.e., their donations and the donations of others are perfect substitutes); pure warm-glow givers only derive utility from their own donation; warm-glow givers are thought to derive utility from the joy of giving (Andreoni, 1989, 1990; Null, 2011). What precisely motivates donors is, however, not easy to identify empirically.

Several techniques have been developed to identify charitable motivations, including Crumpler and Grossman (2008), Gangadharan et al. (2018, 2023), Fielding et al. (2022), Ottoni-Wilhelm et al. (2017), and Carpenter (2021). Donors are typically classified into two extreme categories: warm-glow givers and pure altruists. However, many experimental participants do not fit either strictly defined category, and are best classified as impure altruists. Critically, impure altruists exhibit great heterogeneity in donation behaviour, which suggests a need for further refinement of this category. Crumpler and Grossman (2008) measure the strength of warm-glow preferences, while holding constant altruistic preferences. In contrast, Gangadharan et al. (2023) measure the strength of altruistic preferences, while holding constant warm-glow preferences.

We suggest an alternative approach. Whereas Gangadharan et al. (2018) sort participants into four strict categories (non-donor, warm-glow giver, pure altruist, and impure altruist), we instead identify the *relative strength* of warm glow and altruistic motives using their same two-stage decision task. To accomplish this, we follow Ottoni-Wilhelm et al. (2017) in assuming participants maximise a Cobb–Douglas impure altruism utility function, allowing us to identify structural parameters for giving motives. We thus obtain a novel fluid measure of an individual's strength of altruistic motive, and we validate our measure via a comparison to the survey measure of Carpenter (2021).

2 Experimental design

We use the two-stage decision task of Gangadharan et al. (2018), as implemented by Gandullia et al. (2020). Participants are given 100 points and are asked first to choose an amount, g_1, to donate to their preferred charity.[1] They are informed that we (the experimenters) will donate $100 - g_1$ points to the charity, such that the charity organisation is guaranteed to receive a total of 100 points, regardless of their donation decision. After making this decision, the participant has $100 - g_1$ points left. They are then informed that they have a second (unforeseen) opportunity to donate an amount, g_2, to the charity, knowing that this time no complementary

[1] The options are: Oxfam, Red Cross, Save the Children, World Wide Fund for Nature, and Doctors without Borders.

donation is made by us. Thus, the charity organisation will receive in total $100 + g_2$ points, while the participant will keep $100 - g_1 - g_2$ points.[2]

After completing this giving-type task, participants are asked to respond to the question "Think about the last time you gave to charity before today. What was most important to you?" with possible answers being (i) "the total amount given by everyone", (ii) "the amount that you personally gave", and (iii) "some other aspect of giving".[3] This question was suggested by Carpenter (2021) to elicit giving motivations and was validated using the Crumpler and Grossman (2008) method.

In total, 357 participants completed the experiment/survey on 14 April 2023. These participants (aged 18–65 and fluent in English) were recruited via *Prolific* and redirected to our *Qualtrics* survey. Our subject pool includes 213 male and 140 female participants; 3 participants are gender diverse and 1 preferred not to answer. Two participants preferred not to reveal their age; the average age of the participants who revealed their age is 27.26. The median completion time was 3 min and 6 s, and participants earned on average 1.27 GBP including the fixed participation fee of 1.00 GBP.[4] Ethical approval was obtained from the University of Otago Human Ethics Committee (reference code D23/082).

3 Strength of altruistic motive

Following Gangadharan et al. (2018), a participant is classified as a *non-donor* if $g_1 = 0$ and $g_2 = 0$, a *warm-glow giver* if $g_1 > 0$ and $g_2 = 0$, a *pure altruist* if $g_1 = 0$ and $g_2 > 0$, and as an *impure altruist* if $g_1 > 0$ and $g_2 > 0$.[5] Regarding the question of Carpenter (2021), participants who gave the first response are categorised as *pure altruists* and those who gave the second one as *high warm-glow altruists*. In the following, we construct a more fluid method to measure the extent to which an individual's charitable behaviour is motivated by altruism.[6]

Consider an individual with the Cobb–Douglas impure altruism utility function

$$(1 - \beta - \gamma)\ln(x) + \beta \ln(g) + \gamma \ln(G),$$

[2] Participants who donated the full 100 points in their first decision had no points left for their second decision. Therefore, the second opportunity to donate was only available to participants who did not donate the full 100 points in their first decision.

[3] In between the two tasks, participants visited three different screens that asked their gender, their age, and which day follows after Wednesday. These screens were used to separate the survey question from the giving-type task as both activities were situated within a similar context.

[4] Each point was worth 0.01 GBP.

[5] As noted by Tonin and Vlassopoulos (2013), classifying in this manner assumes that warm glow is satiated in the first round of giving. Gangadharan et al. (2018) had 18 participants, who did not take part in their main experiment, take part in an additional treatment where participants completed the warm-glow task twice. There were positive donations for the first decision, but no participants donated for the second decision. This is consistent with warm glow being exhausted in the first (warm-glow) task in the main experiment.

[6] Chan et al. (2023) employ this method to better understand differences in generosity between charitable dictator games and public good games.

where x is private consumption, g is the amount given by the individual, and G is total funds received by the charity. In the first decision of the Gangadharan et al. (2018) giving-type task, the individual who seeks to maximise this utility (with $x = 100 - g_1$, $g = g_1$ and $G = 100$) will choose

$$g_1^* = \frac{\beta}{1-\gamma}\,100.$$

In the second decision, the individual (using $x = 100 - g_1^* - g_2$, $g = g_1^*$, and $G = 100 + g_2$) will choose

$$g_2^*(g_1^*) = \frac{\gamma\,(100-g_1^*)-(1-\beta-\gamma)\,100}{1-\beta} = \frac{(1-\beta-\gamma)\,(2\,\gamma-1)}{(1-\beta)\,(1-\gamma)}\,100.$$

Thus, choices $\tilde{g}_1$ and $\tilde{g}_2$ yield the following unique values of $\tilde{\beta}$ and $\tilde{\gamma}$:

$$\tilde{\beta} = \frac{\tilde{g}_1\,(100-\tilde{g}_1-\tilde{g}_2)}{20{,}000-\tilde{g}_1\,(200+\tilde{g}_2)} \qquad \text{and} \qquad \tilde{\gamma} = \frac{(100-\tilde{g}_1)\,(100+\tilde{g}_2)}{20{,}000-\tilde{g}_1\,(200+\tilde{g}_2)}.$$

Due to the design of the giving task, $\tilde{\gamma}$ is at least $\frac{1}{2}$. We normalise the parameters to ensure that they lie within [0, 1] using $\bar{\beta} = 2\,\tilde{\beta}$ and $\bar{\gamma} = 2\,(\tilde{\gamma} - \frac{1}{2})$. Furthermore, because of the two-stage design of the giving task, we can estimate the parameters directly on the donation choices without the use of statistics.

We note that this estimation procedure aligns well with the derivations laid out by Gangadharan et al. (2018) for distinguishing different giving motives (see Appendix D, especially equations D7 and D8). An alternative approach might sequentially estimate the $\tilde{\gamma}$ and $\tilde{\beta}$ parameters. However, under such an approach, the individual's preferences change from the first to the second stage, which is inconsistent with the wider literature. Moreover, separating the $\tilde{\gamma}$ and $\tilde{\beta}$ means that the individual never makes a direct trade-off between warm-glow and altruism, which is what we seek to capture. We also note that the rescaling of $\tilde{\gamma}$ and $\tilde{\beta}$ described above is simply a normalisation and does not materially affect the analysis in any way. These monotonic transformations preserve the ordering of parameter values across individuals.

In the spirit of Footnote 9 of Ottoni-Wilhelm et al. (2017), we construct a fluid measure of altruism as $\bar{\alpha} = \frac{\bar{\gamma}}{\bar{\beta}+\bar{\gamma}}$. It captures the amount of generosity that is attributable to the altruistic motive relative to the warm-glow motive. For participants who donated their full endowment during the giving-type task ($\tilde{g}_1 + \tilde{g}_2 = 100$), values for $\bar{\beta}$ and $\bar{\gamma}$ cannot be properly specified, since their donation decisions meet the constraint and do not follow from the first-order conditions of the maximisation problems. As a consequence, $\bar{\alpha}$ cannot be properly specified either. Likewise, for non-donors ($\tilde{g}_1 = \tilde{g}_2 = 0$), we find $\bar{\beta} = \bar{\gamma} = 0$, so $\bar{\alpha}$ cannot be properly specified for these participants.

4 Results

The left plot in Fig. 1 illustrates participants' choices in the giving-type task. The size of each bubble is proportional to the number of participants making that choice. Classifying according to Gangadharan et al. (2018), we have 6% non-donors, 36% warm-glow givers, 9% pure altruists, and 48% impure altruists. Classifying

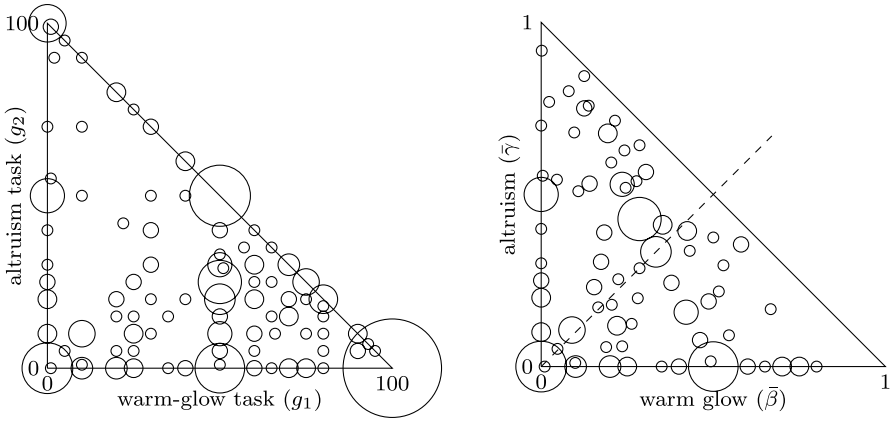

Fig. 1 Participants' decisions (left plot; $N = 357$) and elicited parameters (right plot; $N = 193$) in the giving-type task

according to Carpenter (2021), we have 37% pure altruists and 23% high warm-glow altruists; the residual 40% indicated having another giving motive.

The right plot shows a scatter plot of estimated $\bar{\beta}$ and $\bar{\gamma}$ parameters for each individual. The sizes of the bubbles are proportional to the number of participants for which a pair of parameter values applies. The plot excludes the 164 participants (64%) for whom the constraint was binding (i.e., $\tilde{g}_1 + \tilde{g}_2 = 100$). According to the classification of Gangadharan et al. (2018), 83 (51%) of these participants are warm-glow givers, 12 (7%) of these pure altruists, and 69 (42%) of these impure altruists.

The value $\bar{\alpha}$ is visible via the angle of the ray from the origin. Circles on rays closer to the x-axis represent individuals for whom warm glow is a relatively more important motive for their generosity; circles on rays closer to the y-axis indicate that altruism is the more dominant motive. As noted above, there were 12 pure altruists (according to the Gangadharan et al. (2018) classification) in the excluded group of 164 participants; for these participants, $\bar{\alpha}$ could be set to 1, since their observed generosity cannot be attributed to warm glow. Given that for the 22 (6%) non-donors, the value of $\bar{\alpha}$ cannot be specified, they are, in addition to the earlier 164 participants, excluded from further analysis. The results we present in the next paragraph are robust to including the 12 pure altruists on the budget constraint with $\bar{\alpha} = 1$.

According to the classification of Carpenter (2021), of the 171 included participants, 69 (40%) are pure altruists, 40 (23%) are high warm-glow altruists, and 62 (36%) are in the residual group. Figure 2 presents three cumulative distributions over $\bar{\alpha}$, one for each of the three answers to Carpenter's question. Values of $\bar{\alpha}$ are larger for those who responded with the altruistic answer; differences are statistically significant compared to those who gave the third answer ($p = .0011$) or the second or third answer ($p = .0032$).[7] The

[7] The reported p values are based on two-sided Mann–Whitney tests. For completeness, the difference with those who responded with the second answer is not statistically significant ($p = .1546$). The difference between those responding with the third question and the others is also statistically significant ($p = .0026$), but that between those responding with the second answer and those responding with the third answer is not ($p = .1169$).

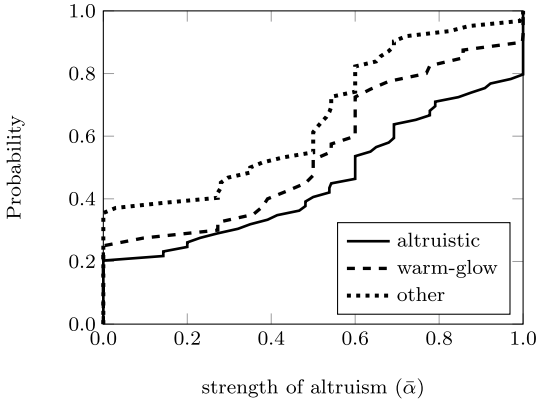

Fig. 2 Cumulative distributions over $\bar{\alpha}$ depending on type of answer to Carpenter's question (altruistic, warm-glow, or other)

observed differences may be mainly explained by the extremes. In this regard, we find that 15 of the 21 participants with $\bar{\alpha} = 1$ responded with the altruistic answer to Carpenter's question. Yet, we can conclude that there is consistency between responses given to the question of Carpenter and the strength of altruism we constructed using choices in the Gangadharan et al. (2018) giving-type task.

We see no major differences in the distributions of males ($N = 213$) and females ($N = 140$) over the four giving types or over the three answers to Carpenter's question. We also do not find a significant difference in their estimated values of $\bar{\alpha}$ ($p = .7821$). We do, however, find differences in the level of generosity. Over the full sample, the average total donation in the giving-type task is 68 points for males and 81 for females ($p = .0001$). However, this difference is not significant ($p = .6397$) when restricting attention to males and females for whom $\bar{\alpha}$ could be specified, with averages of 57 points donated for males and 58 for females. This endogenous selection bias is caused by 59% of females donating the full 100 points, while only 38% of males donated the full amount, due to which $\bar{\alpha}$ could only be identified for 39% of females and 54% of males. Both of these differences in proportions are significant (Chi-square test: $p = .0002$, $p = .0082$).

5 Conclusion

We introduce a novel way to measure individuals' strength of altruist motivation for charitable giving. Participants in an online experiment whose answer to the survey question of Carpenter (2021) indicates a more altruistic giving motive show a larger strength of altruist motivation according to our measure. This adds validity to our constructed measure.

A clear advantage of our method relative to Crumpler and Grossman (2008) and Gangadharan et al. (2023) is that in their methods, respectively, altruism and warm glow are kept constant, whereas our method allows both motives to operate simultaneously. This is important given the large share of impure altruists that is typically observed when using the method of Gangadharan et al. (2018). Another notable

advantage of our method relative to the one by Gangadharan et al. (2023) is that the first stage of their elicitation task involves a binary decision, and with only a 10% chance, the donation will be forwarded to the charity, which leads to many individuals not being recognised as being somewhat generous.[8]

As our method for developing a fluid measure of altruism draws on Ottoni-Wilhelm et al. (2017), it is interesting to compare our results to those reported in that paper. In Fig. 2, which corresponds to the right-hand-plot of Fig. 1, most observations are close to the axes, with the majority of observations having an equivalent of our $\bar{\alpha}$ equal to 0 or 1 (12% and 47%, respectively), and could be captured via the pure altruist and pure warm-glow giving-type categories. Our approach, in contrast, produces a much more even distribution of values of $\bar{\alpha}$ with fewer values at the boundary (27% at 0 and 12% at 1). Yet, we acknowledge that a perfect comparison is not possible given that there are several mechanical differences between the two approaches.[9]

Finally, in our study, $\bar{\alpha}$ could not be specified for 52% of the sample. In Chan et al. (forthcoming) and Chan et al. (2023), we found this fraction to be 43% and 31%, respectively. Although the fraction was lower in those studies, it still constitutes a substantial number of participants for whom $\bar{\alpha}$ cannot be specified. This, together with the potential bias we reported on with regard to gender differences, suggests that our measure is best used in a complementary manner to Gangadharan et al. (2018)'s categorical giving-type classification.

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Data availability The replication material for the study is available at http://osf.io/uh7e8/. More specifically, it provides (1) screenshots of the experiment/survey, (2) deidentified raw data, and (3) *Matlab* code used for the analysis of the data.

Declarations

Conflict of interest None of the four authors has relevant or material financial interests that relate to the research described in this paper.

[8] About 40% of participants in Gangadharan et al. (2023) do not donate, while this is about 6% of participants in our data.

[9] For instance, we have a larger fraction for whom $\bar{\alpha}$ cannot be specified. This, however, may be stemming from Ottoni-Wilhelm et al. (2017) estimating the giving-type parameters using six decision situations, and having fixed donations—which could be interpreted by participants as a giving-norm—below the participants' endowments in each of these decision situations.

References

Andreoni, J. (1989). Giving with impure altruism: Applications to charity and Ricardian equivalence. *Journal of Political Economy, 97*(6), 1447–1458.

Andreoni, J. (1990). Impure altruism and donations to public goods: A theory of warm glow giving. *Economic Journal, 100*(401), 464–477.

Carpenter, J. (2021). The shape of warm glow: Field experimental evidence from a fundraiser. *Journal of Economic Behavior and Organization, 191*, 555–574.

Chan, N. W., Knowles, S., Peeters, R., & Wolk, L. (2023). On generosity in public good and charitable dictator games. Working paper.

Chan, N. W., Knowles, S., Peeters, R., & Wolk, L. (forthcoming). Cost-(in)effective public good provision: An experimental exploration. *Theory & Decision*.

Crumpler, H., & Grossman, P. J. (2008). An experimental test of warm glow giving. *Journal of Public Economics, 92*(5–6), 1011–1021.

Fielding, D., Knowles, S., & Peeters, R. (2022). In search of competitive givers. *Southern Economic Journal, 88*(4), 1517–1548.

Gandullia, L., Lezzi, E., & Parciasepe, P. (2020). Replication with MTurk of the experimental design by Gangadharan, Grossman, Jones & Leister (2018): Charitable giving across donor types. *Journal of Economic Psychology, 78*, 102268.

Gangadharan, L., Grossman, P. J., Jones, K., & Leister, C. M. (2018). Paternalistic giving: Restricting recipient choice. *Journal of Economic Behavior and Organization, 151*, 143–170.

Gangadharan, L., Grossman, P. J., & Xue, N. (2023). Using willingness to pay to measure the strength of altruistic motives. *Economics Letters, 226*, 111073.

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

Ottoni-Wilhelm, M., Vesterlund, L., & Xie, H. (2017). Why do people give? Testing pure and impure altruism. *American Economic Review, 107*(11), 3617–3633.

Tonin, M., & Vlassopoulos, M. (2013). Experimental evidence of self-image concerns as motivation for giving. *Journal of Economic Behavior and Organization, 90*, 19–27.