Inequality, outreach and impact in public goods contributions*

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Abstract

Mobilizing domestic resources is vital in financing domestic investment and social programmes, which are essential for reducing poverty in developing countries. We consider citizens' willingness to contribute to public goods as one mechanism for domestic resource mobilization. In particular, we are interested in how willingness to contribute varies on 3 dimensions: inequality in initial endowments, public good outreach (local versus national), and the expected impact of giving. We conducted a preregistered (AEARCTR-0007746) online experiment with a sample of 900 respondents in South Africa. First, public goods game tasks with equal and unequal endowments were compared to estimate inequality impacts. Second, a dictator game decision with donations to a national charity was compared to the local public goods game to study the effect of project outreach. Finally, to estimate donation impact, charity decisions with quadrupled contributions were compared to those with doubled contributions. We find overall high levels of contribution, with much overlap across the different contexts considered. We note that the highest endowment proportion is contributed in the unequal context, with low endowment players giving the highest share of their endowments. Response time data shows that decisions take longer where donation impact is higher, and endowments are unequal, particularly for those receiving lower endowments.

Key words: Public goods game; Dictator game; Inequality; Charitable giving; Decision time

JEL classification: D90; D63; D64; C93

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1 Introduction

Economic shocks, such as climate change, financial crises, conflicts or pandemics, tend to exacerbate existing inequalities with far reaching implications on development progress in countries, especially developing nations. As such, finding ways to address these economic impacts has become a policy priority for most, if not all, countries. For example, the recent Covid-19 pandemic saw many countries imposing strict lockdown restrictions. These lockdowns had significant economic consequences (World Bank 2020, Saadi Sedik & Xu 2020). The pandemic compounded existing slow economic growth and increased South Africa's untenably high unemployment rate (World Bank 2021).[1] While countries such as the U.S. have used massive cash injections to address some of the economic impacts of the pandemic, the South African government, like many developing nations, faces significant financial constraints. **Junquera-Varela et al. (2017) discusses the challenges facing Low and Middle Income Countries in domestic resource mobilisation: given that increasing tax revenue is not always feasible, countries might supplement government revenues either by borrowing (which can have severe fiscal implications) or with development assistance. Middle income countries like South Africa do not qualify for many development or foreign aid programs. Yet high inequality and poverty levels leave many citizens dependent on government social grants, which require significant funding.** Thus, understanding ordinary citizens' willingness to contribute to the provision of common resources becomes more important, particularly in informing policymakers seeking to advance growth-promoting avenues through domestic resource mobilization.

In this study, we use an online experiment (n=900) to investigate citizens' willingness to contribute to public goods. Since South Africa is characterized by extremely high inequality, we first consider how inequality affects willingness to give. Secondly, with a view to guiding policy to mobilize domestic resources, we explore a few ways in which the impact of donations affects willingness to give. This second part considers both variations in the outreach of given

amounts (comparing donations to a national fund and to local small group investments where the giver also benefits directly from others' donations); and variation in the impact of giving (donated amounts are either doubled or quadrupled).

We investigate local small group investments where the giver anticipates some direct benefit from their own and others' donations using a public goods game. For donations to a wider-scale national fund from which most individuals might not anticipate direct benefits from their own or others' giving, we use donations made to the Solidarity Fund. The Solidarity Fund is a South African public benefit initiative that was set up in 2020 to help with South Africa's response to the Covid-19 crisis. So far, the fund has provided critical medical equipment to hospitals and clinics, food packages and food vouchers to families in need and relief to small businesses that have been severely affected by the pandemic.[2] The Solidarity Fund has subsequently been extended to assist families following severe KwaZulu-Natal and Eastern Cape floods that caused significant infrastructure damage.[3]

In each of our donation decisions, respondents start with a monetary endowment. Decisions are then made about contributions to a small group investment (local context); and about contributions to the Solidarity Fund (national context). Decision-makers make a donation choice in each context, with separate endowments for each decision.

Using an experiment setting, the main part of the study investigates 4 interrelated research questions: i) Does inequality impact public goods contributions? ii) Does people's willingness to contribute to a public good differ between local public goods (with narrower outreach but a greater direct benefit to the individual) and national public goods (with broader outreach but a less direct benefit to the individual)? iii) Does people's willingness to contribute to a public good vary with the expected impact of their contributions? Finally, iv) does people's willingness to contribute to a public good vary with their expectations of others' contributions?

We explore the impact of inequality on giving in two ways: first, we follow previous research (Anderson et al. 2008; Buckley & Croson 2006; Keser et al. 2014) in comparing public

goods game contributions with equal and unequal endowments; second, we ask (anonymous) respondents to report their approximate household income, allowing us to consider whether differences in income predict contributions from an endowment. To study the role of project outreach, we compare contributions made to a small group investment to contributions made to the National Solidarity Fund. Finally, to investigate the role of the impact of giving (consider policies where contributions are met with matched amounts by businesses or philanthropic organizations), we vary the multiplier on amounts donated to the Solidarity Fund (decisions are made where given amounts are either doubled or quadrupled).

Both the public goods game (local resource) and charity giving game (modified dictator game with the Solidarity Fund as a receiver, where a multiplier increases a contribution made to the Solidarity Fund) share the characteristic of having the optimal self-interest based strategy of not contributing at all; but the socially optimal strategy of contributing the maximum amount. Existing literature shows that many people contribute positive amounts in both contexts (Zelmer 2003; Engel 2011). However, to date, limited literature exists directly comparing contributions in these contexts.

Our hope is to better understand the role of different levers (explicit acknowledgement of inequality, outreach of contributions, anticipated own benefit from contributions, and impact of contributions) in explaining charitable giving. Having a better understanding of the factors influencing willingness to contribute to community or national resources will help to inform policy on community engagement in public goods provision and facilitate domestic resource mobilization for development.

In addition to investigating these levers, we also contribute to the decision time literature by investigating whether time taken to make a donation decision varies with the decision task. We find that decisions are made faster on average in the low impact public investment (Solidarity Fund) decisions than in the high impact decisions; and that decisions take longer where inequality exists in initial endowments than where all participants receive equal endowments. This is particularly true for participants receiving lower endowments in the

unequal decision task. Given the mixed results in the literature to date on decision time and giving, we also ask whether slower decisions are associated with higher or lower donated amounts than faster decisions. Our research supports the finding that faster decisions are associated with greater giving than slower decisions. Finally, we investigate whether giving can be predicted from a range of self-reported attitude measures.

2 Literature

2.1 Giving to public goods

Public goods, defined by Pigou (1932) as goods for which the use by one agent does not preclude the use by others, have been widely studied in economics. The challenge with typical public goods is that while such goods offer benefits to all, because they are non-excludable, people tend to consume too much of them; or to "free ride", being unwilling to contribute to the costs of the provision or upkeep of such goods. There is a social optimum, where everyone contributes and high levels of public good provision are feasible; but there is also a dominant strategy equilibrium where no-one contributes, since all players are always better off (in terms of their own self-interested gains) by not contributing, but enjoying the benefits of other's contributions.

A large body of research since the 1980s has used public goods games as tools to examine willingness to contribute to public goods, and factors impacting this willingness. Public goods games typically take the form of participants in a group each receiving an endowment, and having to choose how much (if any) of that endowment to allocate to a pool that is shared by the group.[4] In general, results have been encouraging: people are willing to contribute an average of close to 38% of an endowment to a public good (Zelmer 2003), even when their own gain from that good is far less than their gain from not contributing. A multiplier m (such that $1 < m < n$, where n is the number of group members) is usually applied to all contributions such that the marginal per capita return from investing in the

public good is less than that from not investing. Considering only the decision maker's final outcome, this set-up produces the dominant strategy equilibrium of free-riding, where no players choose to contribute. It also produces the social optimum of all players contributing the full endowment.

Given the high levels of inequality that exist in South Africa, we are interested in the impact of inequality on giving in this context. Some evidence suggests that unequal societies might be less able to interact as communities (Alesina & La Ferrara 2000; Bowles & Gintis 2002), predicting a negative impact of inequality on public goods contributions. This effect has been seen in some public goods experiments, where inequality and information about inequality decreases contributions (Cherry et al. 2005; Anderson et al. 2008; Keser et al. 2014; Hargreaves Heap et al. 2016; Brañas-Garza et al. 2021). In contrast, in a public goods experiment with members of fishing communities in South Africa, Burns & Visser (2008) finds that groups characterized by inequality show higher average levels of contributions to the public good than groups with equal endowments.[5] Other experiments find similar shares of endowments contributed by high and low endowment players where income inequality is introduced through unequal endowments (Buckley & Croson 2006; Chan et al. 1997; Chan et al. 1999; Hofmeyr et al. 2007).

2.2 Charitable giving

A considerable body of research uses dictator games to study charitable giving (Engel 2011 surveys the literature). Eckel & Grossman (1996) replaced the anonymous partner in a dictator game with a charity, the American Red Cross, as a partner for the first time. They find that individuals donate more to a charity than to an unknown receiver. Research on charitable giving has found higher contributions where a choice of charities is given (Carpenter 2007). Research has also considered limiting the contribution options (Grossman & Eckel 2012), influencing the perceived worthiness of a charity (Fong & Luttmer 2011), comparing students to non-students (Carpenter 2007; Lehrer & Porter 2018) and comparing

giving from earned versus unearned endowments (Bjorvatn & Coniglio 2020; Umer 2020). Gender differences in charitable giving have also been investigated (Eckel & Grossman 1996; Eckel & Grossman 2008; Croson & Gneezy 2009; Umer 2020).

Despite this body of research on charitable giving, mainly using lab experiments, less research has considered differences between donations made to charity organisations based on characteristics such as impact or outreach level. A few studies have investigated the level of organisations in eliciting charitable giving (Li et al. 2011; Eckel et al. 2018). Both of these studies found greater giving to higher level (national) organizations than to local organizations. There is also some literature considering the impact of group size on public goods contributions (see Pereda et al. 2019 for a summary). The classical prediction would be that larger groups would mean lower contributions, since sharing contributions with more people means lower individual gains for a given cost of cooperation. Research has not supported this: the meta-analysis in Zelmer (2003) finds a moderate positive impact of group size on contributions in public goods games, also supported in more recent work (e.g. Andreoni 2007; Barcelo & Capraro 2015; Pereda et al. 2019).

2.3 Decision time and giving

Considering a different aspect of contributing to public goods, Lohse et al. (2017) draws on dual-system literature to ask whether decisions to contribute to public goods are intuitive (fast) or reflective (slower) decisions. This follows a recent body of literature where time taken to respond to questions is measured, and inferences drawn about the nature of the decision. Lohse et al. (2017) note that more time is taken for decisions where people contribute to a public good than where people choose not to contribute. However, research findings in this area are mixed. For example, Rand et al. (2012) and Rand & Kraft-Todd (2014) find that more cooperative decisions are made impulsively (fast decision times) in public goods games and Cappelen et al. (2016) finds that greater giving is associated with faster decisions in dictator games. However, other authors have found opposite effects (e.g. Piovesan &

Wengström 2009; Ubeda 2014).

We contribute to the literature by conducting a lab-in-the-field experiment where participants make a range of donation decisions to a local small group project and to the Solidarity Fund (national project) from fixed endowments. We represent local public goods as cooperative decisions with direct quantifiable benefits to the donor; and national public goods as donations to a charitable fund, where the specified fund is set up to (at least indirectly) benefit all South Africans. This means that there is a smaller (and often indirect, for example by increasing employment) expected benefit from contributing. Since much group size research has focused on the size of the expected benefit to the decision maker (e.g. Pereda et al. 2019), we also add the dimension of size of expected benefit to others through varying the multiplier on the charitable donation.

Given the range of findings on inequality and willingness to contribute to public goods, we see value in investigating this question with respondents in South Africa. First, most of the existing empirical literature on public goods games focuses on developed countries with limited evidence on developing countries, especially in Africa, where the barriers to broader public engagement for domestic resource mobilisation remain substantial (IMF 2018).[6] Second, public goods tend to be under provided and underfunded, which may affect prospects for economic development. Evidence shows that effective provision of public goods is an important element of quality of life. For example, Kaplanova (2016) finds a positive correlation between providing local public goods and the local economic development in Slovakia during and after the European Union economic crisis. More recently, Tamai (2022) examine the government policy of public good provision and its effects on the economic growth and welfare in an endogenous growth model with altruistic overlapping generations. The author finds that economic growth is not independent of the government policy because public goods and investment are strategic instruments to reduce intergenerational resource misallocation.

Exposure to inequality may impact on economic decisions and a micro-level foundation can be especially important in explaining macro-level outcomes that associate increasing

inequality with poor economic performance. Inequality is linked to policy outcomes through its impact on taxation and redistribution, as well as its effects on group cohesiveness. Further, if decision time in this context has a strong connection to the level of giving, understanding this relationship could help with policies aimed at increasing cooperation in contributing to public goods. Overall, contributions to public goods could be a worthwhile mechanism used by policymakers as a poverty alleviation strategy to improve social well-being and contribute to sustainable economic development.

3 Method

3.1 Participants

A sample of 900 South African residents was recruited to participate in an online experiment, where participants made contribution decisions in four different tasks. Our sample demographics are similar to country demographic splits for race and gender. The online nature of the sample, however, results in lower proportions of older and lower income respondents relative to country demographics, as well as an over representation of more educated respondents. The demographics of the sample and the corresponding country demographic details, where available, are detailed in Table 1.[7]

TABLE 1 ABOUT HERE

All 900 participants participated in all tasks, except for the inequality treatment, where participants were randomly assigned with equal probability either to the high or the low endowment group. In this split treatment, for a minimum detectable effect of 0.2 standard deviations and a power of $beta = 0.8$ with 2-tailed hypothesis testing at $alpha = 0.5$, we would need a minimum sample size of 340. To increase the power to 0.9 would require a minimum sample of 455. Our larger sample, therefore, allows for well-powered statistical tests.[8]

The set-up where participants participated in all four tasks, with the order of tasks

randomised, allowed us to consider two different analysis approaches. Having subjects answer all questions allowed us to include within-subject analysis for many of our research questions. Pereda et al. (2019) notes that such within-subject analysis, where the same participants are exposed to different treatments, is rare in the public goods game literature despite its benefit for statistical power. Moreover, randomising the question order meant that each contribution question would be the first question seen by approximately a quarter of respondents. This allowed us to get a "clean read" for each question, without any possible confounding effects of respondents having previously encountered different questions.

Recruitment was conducted by a specialist online survey company: TGM Research. Respondents completed the survey online, after reading and confirming agreement with an informed consent explanation. Following much experimental research (e.g. Grether & Plott 1979; Starmer & Sugden 1991; Lohse et al. 2017), we used a random incentive system whereby 100 participants were paid for one of the 4 experimental tasks based on their choices (and the choices of other participants for the public goods game). Providing actual payments based on choices leads to more meaningful and reliable choice behavior of participants. Specifically, the likelihood of actual pay-outs encourages subjects to make honest and non-arbitrary choices that reveal their true preferences (e.g. Neill et al. 1994). As is typical in these kinds of experiments, we reminded participants that because 100 participants would be randomly selected for a randomly selected choice to be paid out in real money, they should make all 4 decisions as if they would be paid so that they would be happy with the outcome at the end of the experiment. The study was approved by the University of Pretoria Economic and Management Sciences Ethics committee: Protocol number EMS205/20.

3.2 Experiment

Respondents were first asked to participate in 4 experimental tasks to investigate their contributions to public goods in different scenarios. The order of the decisions was randomised to reduce any order effects and to allow for a "clean read" on each question among a subset

of respondents, as discussed previously. The tasks included two public goods game tasks, following the typical public goods game (voluntary contribution mechanism) set-up: respondents were given a monetary endowment and were asked to stipulate an amount (including zero) from the endowment that they would like to put into a group investment. Participants were informed that contributions from the four members of their group (including themselves) would be doubled and that the resulting amount would be divided equally among the four group members. Any amount that participants did not contribute to the group investment would be kept.[9] Since we used a multiplier of 2, this gave a marginal per capita return on investment of 0.5. That is, our public goods game followed the common approach where the dominant strategy equilibrium outcome for participants concerned only with their own payment would be to contribute nothing, while the social optimum would be for all participants to contribute their entire endowment. One of the public goods game tasks had all four participants receive the same endowment: ZAR500. The other had unequal endowments, where participants were randomly assigned to receive an endowment of either ZAR300 or ZAR600. In this task, all participants were made aware that their group included 2 participants with ZAR300 and 2 participants with ZAR600.

The other two tasks used a modified dictator game, where participants again received an endowment and had to choose how much of the endowment to keep and how much to contribute to a public good, the Solidarity Fund.[10] We varied the impact of contributions in these tasks by having two scenarios. The first allowed for a direct comparison with the equal endowment public goods game: participants received an endowment of R500, and any contributions were multiplied by 2. The second scenario allowed us to directly compare contributions with higher and lower impacts: here, the endowment remained R500, but contributions were multiplied by 4, doubling the impact of each rand contributed. Examples were included in the survey to explain the payments resulting from possible decisions. To reduce possible experimenter demand effects (Zizzo 2010), these examples included a range of possible contributions.

To investigate the impact of beliefs about others' contributions on contribution decisions, we asked participants to report what they believed to be the average contribution of other participants for each of the tasks. This question on beliefs was incentivized by paying an incentive of ZAR500 to the participant guessing closest to the true average across all respondents for each game.

For our decision time analysis, the four experiment questions were timed, with time from opening the decision screen to submission of a decision being used as the metric for time taken for a decision.

In addition to the experiment questions, we asked participants to complete a short survey on their household income, education level and demographics (age, gender, race). We also asked respondents whether they owned a small business. Finally, following Burns & Keswell (2015), we include a few self-reported attitude questions to see how these self-report measures relate to our experimental measures of giving.

4 Estimation strategy

We start our analysis with two-tailed Wilcoxon tests to compare the mean proportion of the endowment contributed in the different treatments. First, we compare contributions in the public goods game under equal versus unequal endowments. Next, we compare local public goods contributions to national Solidarity Fund contributions (using the scenarios with endowments of ZAR500 and multipliers of 2 for both tasks). Finally, we compare Solidarity Fund contributions with the higher and lower multipliers. We use two-tailed tests, given uncertainty about the direction of differences. For example, anticipating a higher impact from contributions might increase the desire to contribute but might also result in lower contributions where participants realise that the same benefit can be achieved with a smaller contribution. We use Cohen's d-test to estimate effect sizes for these comparisons. Based on Cohen (1988), we interpret differences of at least 0.2 standard deviations as indicative of

meaningful differences.

We complement these comparisons with regression analysis, allowing us to include controls for respondents' demographic characteristics and to consider interactions between different variables of interest. To benefit from the increased power of using all responses for each respondent, our main analysis uses the full set of responses. In the Supplementary Appendix, we repeat our analysis using between-subject analysis, comparing responses for the contribution question that was asked first to each respondent.

Our simple model for estimating the impact of inequality of endowments takes the following form:

$$contribution_i = \alpha_0 + \beta_1 inequality + \beta_2 high + \beta_3 expect_i + \gamma \mathbf{X} + \epsilon \quad (1)$$

where $contribution_i$ is the percent of the endowment contributed in the public goods game task by respondent i. $Inequality$ is a dummy variable taking the value of one for the task where endowments are unequal, and zero for the task where endowments are equal; $high$ is a dummy variable taking the value of one for respondents receiving the ZAR600 endowment in the unequal game, and zero otherwise. We include an additional series of predictor variables to investigate the role of expectations in predicting transfer decisions: $expect_i$ includes the average expected contribution in the equal endowment public goods game, as well as the average expected contributions of high and low endowed players in the unequal public goods game, reported by respondent i. Finally, the matrix of control variables $\mathbf{X}$ includes demographic variables for individual i such as race, gender, age, education, owning a small business, job loss due to the Covid-19 pandemic, and high or low household income. Since question order was randomised, in our analysis of all responses, we also control for the order in which the questions were asked.

We follow a similar approach in assessing differences in contributions to the public good

(either local or national):

$$contribution_i = \alpha_0 + \beta_1 national + \beta_2 localexpect_i + \beta_3 diffexpect_i + \gamma \mathbf{X} + \epsilon \qquad (2)$$

As before, $contribution_i$ is the percent of the endowment contributed to the relevant public good (local or national) selected by individual i, *national* is our primary variable of interest, taking the value 1 for contributions to the national public good (Solidarity Fund) and 0 for contributions in the local (4 player) public goods game. To isolate the role of the outreach of contributions, in this estimation we consider only the otherwise similar local and national scenarios where all respondents were endowed with ZAR500 and where the multiplier for contributions made to the public good is 2. We again include the role of expectations in our estimate: $localexpect_i$ is the expected average contribution to the local public good reported by respondent i; and $diffexpect_i$ is the difference between expectations reported by individual i for the average contribution to the local public good and the average contribution to the national public good. As before, our matrix of control variables is included.

Finally, to investigate whether the impact of donations affects willingness to donate, we estimate the following model, where most variables are similar to the other models:

$$contribution_i = \alpha_0 + \beta_1 highimpact + \beta_2 expect2_i + \beta_3 expectdiff_i + \gamma \mathbf{X} + \epsilon \qquad (3)$$

Our sample for this regression includes the two donation decisions where the Solidarity Fund is the receiver. $Highimpact$ is a dummy variable taking the value 1 for the contribution decision where contributions are multiplied by four instead of two. Again we consider the role of beliefs about others' behaviour: $expect2_i$ is the expected average contribution in the low multiplier scenario reported by individual i; and $expectdiff_i$ is the difference between the expected average contribution in the low multiplier and high multiplier decisions reported by individual i. Again, our matrix of control variables is included.

5 Results

Recall that respondents answered four contribution questions, where the question order for these questions was randomised. This gives us a well powered within-subject study design, as well as a smaller sample between-subject design whereby we can compare responses only among those who answered each question first. The latter isolates a single decision, without any confounding effect of having previously answered other similar questions. Because of the better power of the within-subjects design, and the fact that in reality, people likely do have multiple demands on their money (for example, it is not unrealistic to imagine being asked to contribute to a small group project as well as to a bigger charity), we use this data for our main regression analysis. We cluster standard errors at the individual level in our OLS regressions and also consider fixed effects panel regressions, accounting for the order of the questions. In the Supplementary Appendix, we include replications considering only the first question asked of each respondent as a test for the robustness of these findings.[11]

Figure 1 presents the distributions of the percentage of the endowment contributed for each question. Results from Figure 1 show that contributions are not normally distributed.

FIGURE 1 ABOUT HERE

Since contributions are not normally distributed, we next use Wilcoxon rank sum tests to compare average contributions across our four decision scenarios, and also between the high and low endowment participants for the unequal scenario. These results are shown in Table 2, both for the first question asked and for all responses combined.

TABLE 2 ABOUT HERE

We note that where all responses are included (right hand panels in Table 2), average contributions are similar across most decisions. The exception is the unequal scenario, where higher contributions are driven by the higher percentages contributed by players receiving low endowments. We see bigger differences in average contributions in the first position data, where we report only on the first question asked to respondents. Here, too, we see the biggest difference in the inequality treatment. Both low and high endowed players in the

unequal treatment give a higher proportion of their endowment than is given in the equal endowment treatment. Again, it is the low endowed players who contribute the highest proportion of their endowment to the small group investment. In the first question data, we also see somewhat higher contributions made to the national public good (the Solidarity Fund) than to the equal endowment local public good. This aligns with previous findings of higher contributions to national versus local charities (Li et al. 2011, Eckel et al. 2018). Changing the impact of donations to the national public good does not significantly impact the average percentage contributed.

We included a question asking respondents about any difficulties understanding the experimental tasks, and note that results are very similar where respondents reporting finding the tasks "a bit difficult to understand" or "very difficult to understand" are excluded from the analysis. We also considered average contributions for high income (household income of at least ZAR20,000 per month, n=260) and low income (household income less than ZAR2,000 per month, n=129) respondents. Average contributions across all tasks were slightly higher for high income respondents (Mean 54.55%, s.d. 25.87) than for low income respondents (Mean 50.08%, s.d. 25.56). Research by Hargreaves Heap et al. (2016) found that high income respondents decreased their contributions in unequal settings. This finding does not replicate in our research: both high and low income respondents gave higher percentage contributions in our unequal scenario.

To confirm that these descriptive comparisons are robust to the inclusion of a range of demographic variables, and to test our final research question about the role of expectations about others' contributions, we estimate OLS regressions with clustered standard errors and fixed effects panel regressions.

5.1 Inequality

Our first research question asked about the role of inequality in contributions. These results are reported in Table 3. We start with simple regressions in columns (1) and (2), then add our

demographic control variables in column (3). In column (4) we include reported expectations about others' contributions and question order. We note that the finding of higher percentage contributions with unequal endowments is robust to the inclusion of demographic control variables. The higher proportion contributed by lower endowed players is also robust to the inclusion of demographic controls. In column (4), we note a significant relationship between own contributions and beliefs about others' contributions.[12] Reported beliefs and own decisions are very similar, with a mean difference of just over 1% between these 2 numbers. Finally, in column (5) we include a fixed effects panel regression, again controlling for question order. This, too, shows significantly higher proportions contributed in the unequal scenario. The Supplementary Appendix includes a replication of this analysis where only the first decision is considered for each respondent. Directionally similar results are seen in this analysis, although the magnitude of the difference between the percentage contributed in the equal and unequal endowment scenarios is larger.

TABLE 3 ABOUT HERE

5.2 Outreach

Next, we consider our second research question, about whether contributions with a greater outreach (but a less direct benefit to the contributor) differ from those with a far smaller outreach, but where the contributor receives some direct benefit from contributing. In Table 4, we compare our national public good contribution to our local public good contribution, where both contributions are doubled and where the starting endowment is the same in both cases. Again, we start in column (1) with a simple regression on the independent variable of interest, then add demographic controls in column (2), and add expectations of others' contributions in column (3) and a fixed effects panel regression in column (4). Here we do not see significant differences in the percentage contributed for small group versus national fund decisions. In column (3), we again see a significant link between expectations of others' contributions and own contributions. It is worth nothing that our adjusted R-squared values

for the OLS regressions are very small before expectations are included. As seen in Table 2, this finding changes when only responses to the first question asked are analysed: here contributions are higher for the national public good (Solidarity Fund) than for the small group. These regressions including only the first question are included in the Supplementary Appendix.

TABLE 4 ABOUT HERE

5.3 Impact

Finally, in Table 5 we consider our research question about whether national fund contributions with a higher impact will elicit larger contributions than contributions where the national fund is expected to have less impact. Surprisingly, we see no significant differences in the percentage contributed when doubling the impact of contributions.

TABLE 5 ABOUT HERE

In Figure 2, we investigate whether the lack of difference between average high and low impact contributions could be because some respondents might increase their contributions where they expect their contribution to be more impactful; while others might reduce their contributions seeing that the same impact can be achieved with a smaller contribution. Figure 2 plots the difference between the percent contributed in the high and low impact scenarios. While we observe some evidence of a distribution of contributions, with some respondents contributing more and others contributing less where the impact of contributions is higher, more than 40% of respondents give the same contribution in both scenarios.[13]

FIGURE 2 ABOUT HERE

5.4 Decision Time

Overall, we find a small but significant ($p<0.01$) negative correlation (ρ = -0.08) between response time and the percentage of the endowment contributed. This suggests that respondents who took more time to make a decision gave less than those who decided in less time.

This relationship is slightly stronger for the local (public goods game) decisions (ρ = -0.12) than for the national (Solidarity Fund donation) decisions (ρ = -0.064).[14]

Table 6 presents the decision time for different decisions in more detail. We note that respondents take longer to decide, on average, where Solidarity Fund contributions have a higher impact (donations are quadrupled) than where the impact is lower (donations are doubled). **This suggests that decision makers are spending more time deliberating when their decision will have a greater impact. This might entail respondents' considering whether to give more, given the higher impact of giving; or whether to give less, given that even a smaller gift might achieve a meaningful impact.** This effect remains marginally significant (at p<0.1) where only first position decisions are considered.

The decision times are longer for the local decisions, where public goods games are used. This is likely because of the increased complexity of understanding the task for these decisions. We therefore do not compare local and national decision times, since the task difference likely explains much of the difference in decision time.

Within the local resource sharing decisions, we note that decision time is longer on average where endowments are unequal than where endowments are equal. Further, in the unequal endowment scenario, decisions take longer on average for respondents who start with lower endowments than for those who start with higher endowments. **This difference in decision time in the unequal scenario points to greater deliberation in a less straightforward decision context. High endowment respondents in the unequal scenario might question whether they should give more to equalise an unequal setting, or whether a smaller amount might suffice, since this would give proportionally more value to a lower endowed player. Similarly, those with lower endowments might deliberate between giving a higher proportion of their endowment in order to be making a more equal contribution to the group public good; and giving less, hoping to receive an equalising transfer from the higher**

endowed players. Previous literature (Burns & Visser 2008) argue that low endowment players might give a higher proportion of their endowment to signal their cooperativeness. This might help to explain slightly longer deliberation by lower endowed players, who might be considering any strategic value to their decisions.[15]

Overall, we see longer decision times for the decisions that appear to involve greater cognitive complexity: higher impact decisions; and decisions in a context of clear inequality.

TABLE 6 ABOUT HERE

Table 7 presents regression analysis supporting the findings in Table 6, controlling for a range of demographic variables. As in Table 6, high impact decisions take longer on average than low impact decisions, and decisions with unequal endowments take longer than those with equal endowments. The shorter decision time for high versus low endowment players in the unequal endowment game is not significant in the regressions.

TABLE 7 ABOUT HERE

5.5 Attitude measures and giving

Table 8 reports self-report measures from Burns & Keswell (2015), where respondents were asked whether they agreed or disagreed with a range of statements designed to better understand their attitudes.[16] It is interesting to note that the statement about the trustworthiness of most people sees the smallest number of people agreeing (33%). The majority of respondents agrees that other people are selfish (73%) and are likely to try to take advantage of people (82%). More encouraging, most people agree that treating others well will result in good treatment in return (81%), and the vast majority of respondents (93%) agrees that having a motivation beyond self-interest is important.

The average percentage of the endowment given by people who agree and disagree with each statement is shown in Table 8.[17] Wilcoxon rank-sum tests show that many of these attitude measures predict differences in giving behaviour.[18] Specifically, people who agree

with the statement about reciprocity give more on average than those who disagree with this statement. The same is true for the statement about the trustworthiness of people in general. Agreement with statements related to bad behaviour by others, specifically the selfishness of others and the likelihood that others will try to take advantage of people, is associated with lower giving. Agreement with the final two statements, about the importance of motivations beyond self-interest and about cooperation being better than competing, does not predict giving.

TABLE 8 ABOUT HERE

6 Discussion

In order to better understand the role of different factors in predicting willingness to contribute to public goods, we ran an online experiment in a sample of 900 South Africans. We investigated four research questions. First, we asked whether inequality would impact willingness to give. Here, we used the percentage of the endowment contributed to a small group investment in a public goods game. A scenario where all respondents had the same initial endowment was compared to one where initial endowments were very unequal (half of the group had double the initial resources compared to the other half of the group). We found significantly higher proportions contributed where endowments were unequal, with the highest percentage contribution coming from the low endowment players. Similar results were seen when respondents from high and low income households were considered separately.

Second, we asked whether the scale or outreach of the project would impact willingness to give. We compared giving to the small group investment in the equal endowments public goods game to giving to the national Solidarity Fund, ensuring that the both the endowment and the impact of donations (contributions were doubled by the experimenter) in both cases was the same. Where we looked only at respondents who saw each question first, we found somewhat higher contributions to the national fund. However, this result was not robust to

considering all responses to both questions.

Third, we investigated the impact of donations to the national public good. Contributions made to the Solidarity Fund were either doubled (low impact) or quadrupled (high impact). Overall there was no difference in amounts contributed in these two scenarios. Some respondents gave more in the high impact scenario, perhaps believing that a higher impact justified a higher investment; while others gave less in the high impact scenario, perhaps noting a similar return could be achieved with a smaller outlay. The modal behavior was, however, to give the same contribution in both scenarios.

We investigated the role of beliefs about others' contributions in own contribution decisions. We noted that reported beliefs about others' contributions were very similar overall to own contributions. Including these beliefs notably improved the predictive power of our regressions. The direction of this close relationship can, however, not be disentangled in our data. It is possible that respondents simply used their own decisions as their best guess about other's behaviour. It is also possible that respondents made their own decisions based on how they believed others would behave. We hope to disentangle this relationship in future research.

This research also contributes to the decision time literature, by considering the relationship between giving and decision time, and particularly whether average decision time varies with the decision task. The existing research on giving and decision time has mixed findings for this relationship, with some researchers finding that slower decisions are associated with greater giving, and others finding the opposite. Overall, we found a small but significant relationship between decision time and giving, suggesting that faster decisions are associated with higher donated amounts than slower decisions. This relationship held both in the national (dictator game) giving task and in the local (public goods game) task, with a higher correlation being seen in the public goods task. Considering variation in decision time with the decision task, we found that donation decisions to the Solidarity Fund with a higher impact took longer on average than those with a lower impact. We also noted that decisions

in games with inequality (unequal endowments at the start of the game) took longer than otherwise similar decisions where starting endowments were equal. **We hypothesise that the greater cognitive complexity associated with higher impact decisions and decisions in the context of explicit inequality likely explains these longer decisions times.**

Domestic resource mobilization is necessary for developing countries to recover from the effects of crises (including the COVID-19 pandemic) and to restore progress toward achieving an inclusive society in the long run. Our results do not give clear guidance on the best way to elicit high contributions to public goods in South Africa. The lack of robust differences in giving to a national and local public good might indicate the systemic and persistent nature of inequality in the country. On the other hand, the high levels of overall contributions, coupled with the higher contributions in our unequal scenarios, are very encouraging and suggestive that a high level of inequality does not reduce the willingness to cooperate in South Africa. More research is needed to understand better the forces that affect individuals' decision-making, particularly in the critical area of supporting the goods and services that serve society.

Notes

[1]South Africa entered into the COVID-19 pandemic after several years of slow economic growth. In 2019, the economy grew by 0.2% (in 2018 it was 0.8%) partially caused by the resurgence of electricity outages associated with operational and financial difficulties at the energy utility Eskom. The persistence of the pandemic at the global and domestic levels is expected to constrain the economic recovery (World Bank 2021).

[2]https://www.prnewswire.com/news-releases/direct-relief-joins-solidarity-fund-to-help-south-africans-overcome-covid-19-crisis-301105258.html

[3] https://solidarityfund.co.za/media/2022/04/SOLIDARITY-FUND-TO-SUPPORT-AND-AUGMENT-GOVERNMENTS-RESPONSE-TO-KZN-AND-EASTERN-CAPE-FLOODING-FNL.pdf

[4]Variations of the public goods game include introducing an option to punish non-contributors, with seminal contributions from Ostrom et al. (1992) and Fehr & Gachter (2000); as well as introducing the role of inequality through different endowments (e.g. Buckley & Croson 2006; Chan et al. 1997); and looking at the role of social identity theory (Tajfel 1982) in impacting group members' willingness to contribute to a group public good (Burns & Keswell 2015).

[5]Burns & Visser (2008) proposes a potential mechanism for the higher contributions from unequal groups, and particularly from those with lower endowments in the unequal groups: those with lower initial endowments (poorer) stand to benefit relatively more from the public good than those with higher endowments (wealthier). The higher relative contributions from the low endowment players might represent an attempt at signaling their willingness to cooperate to group members with more resources.

[6]Two exceptions are work by Hofmeyr et al. (2007) and Burns & Visser (2008) that examine inequality and contributions in public goods games in South Africa. These studies consider very specific samples; the former uses high school students, and the latter uses fishing communities. In contrast, this study uses a larger and far broader sample in the country.

[7]South African gender, race, age and job loss statistics are taken from Statistics South Africa; education statistics are from www.dhet.gov.za. Mean monthly household income in South Africa is estimated as approximately ZAR 14,524 (adjusted for inflation from Statistics South Africa Living Conditions Survey, 2015).

[8]These calculations were based on the standard deviation seen in the fairly recent South African public goods game experiment of Burns & Keswell (2015). We chose a larger sample so that our statistical tests would be well-powered even if our standard deviations differed from this one.

[9]We included an attention check/understanding question to ensure that participants understood this

mechanism. Participants who selected an incorrect response to the mechanism description were thanked for their time and terminated from the survey.

[10]The questions included a brief description of the Solidarity Fund, similar to that found in Footnote 2 in this paper.

[11]Where the findings from the between- and within-subject analysis approaches differ, we highlight the differences in the main results.

[12]This finding cannot be interpreted causally: significant endogeneity is inherent here, since own contributions might be influenced by beliefs about others' behavior, but reported beliefs about others' behavior might also be simply based on own behavior.

[13]We investigated whether any respondents gave the same contribution across all questions: only 3 respondents reported the same contribution for all three questions with a R500 endowment.

[14]**Since respondents answered these questions online, and were not observed, we cannot exclude the possibility that some respondents might have taken longer due to distractions external to the survey. The within-subject nature of our design likely mitigates this concern to some extent. We also note that median decision time measures show the same pattern as the mean measures reported here, suggesting that differences cannot be attributed entirely to individual distracted decision makers.**

[15]Of course, in this experiment, there would be no strategic benefit to giving more, since decisions are not revealed to other players.

[16]The full statements are reported here. Reciprocity: If you treat others well, they will treat you well in return; Trust: Most people can generally be trusted; Selfishness of others: People are generally quite selfish; Take advantage: Most people, if they get the chance, will try to take advantage of you; Beyond self-interest: People should be motivated by something beyond than their own self-interest; Cooperation: It's better to cooperate than to compete.

[17]The few people who reported not understanding each statement are not included in this analysis.

[18]The table shows the average percentage given including the 4 decisions made by each participant. When decisions are considered separately for the national Solidarity Fund decisions and for the small group/local decisions, the findings are very similar, with significant differences for the same attitude statements.

Table 1 – Sample and country demographics

	Sample (%)	**South Africa (%)**
Gender		
Female	51%	51%
Male	49%	49%
Race		
Black	75%	81%
White	13%	8%
Other	12%	11%
Age		
Under 25	23%	18%
25-44	62%	49%
45 and over	15%	33%
Household income		
Under ZAR2000 p.m.	14%	
ZAR2,000 to ZAR19,999 p.m.	57%	
ZAR20,000+ p.m.	29%	
Education		
Incomplete high school	5%	38%
Finished high school	37%	33%
Degree/Diploma	58%	12%
Lost job during Covid-19	24%	7%
Own small business	30%	

Table 2 – Comparisons of average percent contributed

	First position Data				All Data			
	n	mean (s.d.)	Rank sum p	Cohen's d	n	Mean (s.d.)	Sign rank p	Cohen's d
Unequal local	235	56.63 (25.45)	<0.01	0.47	900	55.96 (25.18)	<0.01	0.17
Equal local	242	46.62 (25.83)	0.048	0.19	900	51.54 (26.41)	0.35	0.02
National low	184	51.77 (27.03)	0.96	0.03	900	50.87 (27.26)	0.47	<0.01
National high	239	51.08 (26.2)			900	50.87 (26.09)		
Unequal high	114	53.25 (25.11)	<0.01	0.42	453	51.6 (24.4)	<0.01	0.4
Unequal low	121	63.7 (24.86)			447	60.91 (25.0)		

Table 3 – Inequality: all data, OLS and FE panel regressions

	OLS (1)	OLS (2)	OLS (3)	OLS (4)	FE (5)
	DV: percent of endowment contributed				
Unequal	4.446***	4.446***	4.446***	4.438***	4.443***
	(0.793)	(0.793)	(0.795)	(0.796)	(0.793)
High endowment		-4.955***	-5.067***	-3.532***	
		(1.519)	(1.504)	(1.267)	
Under 25			-1.700	1.029	
			(1.930)	(1.587)	
Over 45			-1.809	-1.202	
			(2.401)	(2.177)	
Female			-5.280***	-3.806***	
			(1.506)	(1.272)	
Black			-1.556	-1.540	
			(2.230)	(1.816)	
White			0.745	0.548	
			(3.194)	(2.708)	
Low income			-1.373	-1.653	
			(2.228)	(2.049)	
High income			3.667**	2.207	
			(1.821)	(1.529)	
Degree			0.927	0.224	
			(1.635)	(1.324)	
Lost job (Covid-19)			3.445*	3.194**	
			(1.843)	(1.552)	
Own small business			-0.161	-0.00154	
			(1.789)	(1.423)	
Question order				0.876**	0.379
				(0.430)	(0.424)
Expected contrib (equal)				0.406***	
				(0.0481)	
Expected contrib (unequal high)				0.0351	
				(0.0524)	
Expected contrib (unequal low)				0.162***	
				(0.0438)	
Constant	51.51***	54.00***	56.33***	20.77***	50.57***
	(0.881)	(1.187)	(2.614)	(3.308)	(1.189)
N	1800	1800	1800	1800	1800
Adj R-sq / F	0.007	0.015	0.031	0.259	3.70 ***

Standard errors in parentheses

* p<0.10; ** p<0.05; *** p<0.010

Table 4 – National versus local: all data, OLS and FE regressions

	OLS (1)	OLS (2)	OLS (3)	FE (4)
	DV: percent of endowment contributed			
National	-0.642	-0.642	-0.751	-0.735
	(0.998)	(1.000)	(1.001)	(0.998)
Under 25		-0.724	0.750	
		(1.837)	(1.458)	
Over 45		0.625	0.778	
		(2.186)	(2.030)	
Female		-4.513***	-2.745**	
		(1.439)	(1.177)	
Black		-0.179	-0.886	
		(2.211)	(1.727)	
White		2.223	2.127	
		(2.993)	(2.478)	
Low income		-2.290	-1.694	
		(2.112)	(1.815)	
High income		2.543	2.432*	
		(1.690)	(1.385)	
Degree		0.716	0.732	
		(1.518)	(1.205)	
Lost job (Covid-19)		3.206*	2.639*	
		(1.683)	(1.374)	
Own small business		-0.825	-1.149	
		(1.709)	(1.349)	
Question order			1.020**	0.871
			(0.478)	(0.552)
Expected contrib (local)			0.630***	
			(0.0342)	
Expected difference local and national			0.314***	
			(0.0317)	
Constant	51.51***	52.41***	17.50***	49.36***
	(0.881)	(2.506)	(2.879)	(1.535)
N	1800	1800	1800	1800
Adj R2 / F	0.000	0.010	0.234	2.07***

Standard errors in parentheses

* p<0.10; ** p<0.05; *** p<0.010

Table 5 – Impact of national contributions: all data, OLS and FE regressions

	OLS (1)	OLS (2)	OLS (3)	FE (4)
	DV: percent of endowment contributed			
High impact	-0.00244	-0.00244	0.0211	0.0265
	(0.691)	(0.693)	(0.697)	(0.692)
Under 25		0.648	0.998	
		(2.056)	(1.762)	
Over 45		2.539	1.496	
		(2.596)	(2.302)	
Female		-2.806*	-1.305	
		(1.638)	(1.380)	
Black		0.375	-1.074	
		(2.509)	(1.972)	
White		2.179	2.128	
		(3.581)	(2.982)	
Low income		-1.553	-1.133	
		(2.394)	(2.198)	
High income		1.363	2.073	
		(1.921)	(1.599)	
Degree		0.644	1.587	
		(1.749)	(1.488)	
Lost job (Covid-19)		2.666	1.535	
		(1.952)	(1.635)	
Own small business		-0.693	-1.353	
		(1.878)	(1.544)	
Question order			0.221	0.271
			(0.468)	(0.385)
Expected contrib (low)			0.599***	
			(0.0351)	
Expected diff (low and high)			0.242***	
			(0.0453)	
Constant	50.87***	50.24***	20.95***	50.17***
	(0.870)	(2.813)	(3.150)	(1.107)
N	1800	1800	1800	1800
adj. R-sq / F	-0.001	0.002	0.246	5.63***

Standard errors in parentheses

* p<0.10; ** p<0.05; *** p<0.010

Table 6 – Comparisons of average times for different decisions

	Decisions (n)	**Mean time in sec. (s.d.)**	**Wilcoxon Rank-sum (z (p))**
Solidarity Fund decisions			
High impact	900	85.70	
		(118.01)	
			-2.33 (0.02)
Low impact	900	74.01	
		(86.42)	
Local sharing decisions			
Equal endowments	900	113.00	
		(119.74)	
			2.37 (0.02)
Unequal endowments	900	124.66	
		(140.09)	
Unequal high endowment	453	119.67	
		(146.48)	
			1.74 (0.08)
Unequal low endowment	447	129.72	
		(133.28)	

Table 7 – Predictors of decision time: OLS and FE regressions

	OLS (1)	FE (2)	OLS (3)	FE (4)
	DV: decision time (seconds)			
High impact (national)	9.401**	9.129**		
	(4.495)	(4.316)		
Unequal endowments			11.93***	11.96***
			(4.369)	(4.352)
High endowment			-2.533	
			(7.095)	
Under 25	-8.217		-12.29	
	(4.993)		(9.087)	
Over 45	7.280		11.39	
	(10.55)		(11.07)	
Female	1.803		4.324	
	(5.292)		(7.257)	
Black	12.25**		15.04*	
	(5.161)		(8.588)	
White	12.98		-13.42	
	(14.06)		(13.39)	
Low income	-6.600		-9.443	
	(5.212)		(11.56)	
High income	2.918		-11.79	
	(7.952)		(8.269)	
Degree	-1.601		-4.513	
	(5.137)		(7.313)	
Lost job	-5.787		-19.35***	
	(6.044)		(7.255)	
Own small business	1.878		9.245	
	(5.427)		(9.306)	
Question order	-21.42***	-23.97***	-29.97***	-32.82***
	(2.423)	(2.403)	(2.339)	(2.329)
constant	120.2***	135.8***	187.0***	194.1***
	(8.982)	(6.902)	(11.02)	(6.526)
N	1800	1800	1800	1800
Adj. R-sq / F	0.055	1.43***	0.075	2.72***

Standard errors in parentheses

* p<0.10; ** p<0.05; ***p<0.010

Table 8 – Attitude measures and giving

	Agree		Disagree		
	n	**Mean (s.d.)**	**n**	**Mean (s.d.)**	**Rank-sum z (p)**
Reciprocity	725	53.00 (26.22)	175	49.38 (26.55)	3.41 (<0.01)
Trust	295	56.68 (26.15)	603	50.15 (26.14)	7.21 (<0.01)
Selfishness of others	655	50.73 (25.88)	241	56.55 (27.16)	-5.43 (<0.01)
Take advantage	741	51.64 (26.24)	157	55.52 (26.51)	-3.39 (<0.01)
Beyond self-interest	834	52.44 (26.24)	59	50.24 (26.79)	1.58 (0.11)
Cooperation	755	52.50 (25.97)	139	51.77 (28.23)	1.14 (0.25)

Figure 1 – Comparisons of percent of endowment transferred

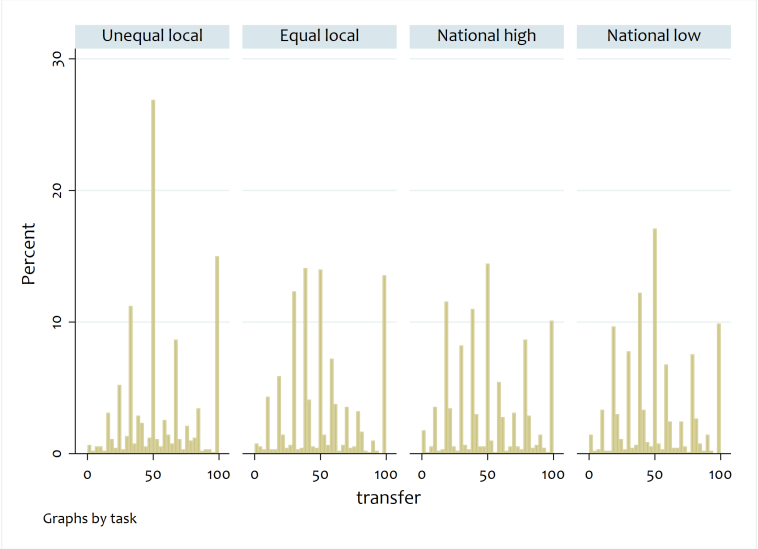
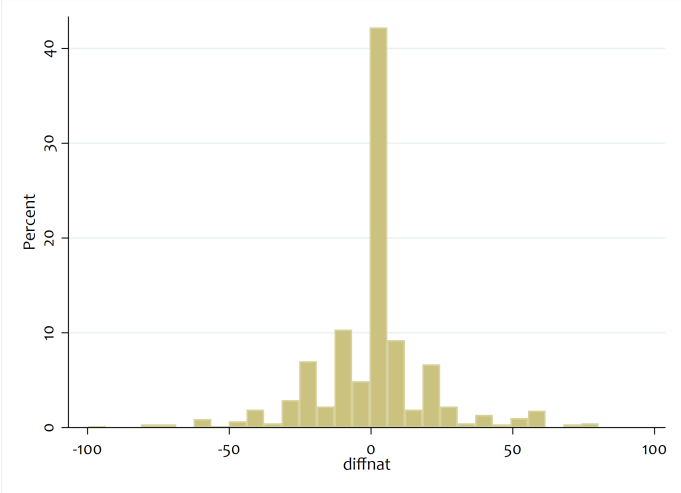


Figure 2 – Difference in contributions between high and low impact scenarios



References

Alesina, A. & La Ferrara, E., 2000. 'Participation in heterogeneous communities', *The Quarterly Journal of Economics* **115**(3), 847–904.

Anderson, L. R., Mellor, J. M. & Milyo, J., 2008. 'Inequality and public good provision: An experimental analysis', *The Journal of Socio-Economics* **37**(3), 1010–1028.

Andreoni, J., 2007. 'Giving gifts to groups: How altruism depends on the number of recipients', *Journal of Public Economics* **91**(9), 1731–1749.

Barcelo, H. & Capraro, V., 2015. 'Group size effect on cooperation in one-shot social dilemmas', *Scientific Reports* **5**(1), 1–8.

Bjorvatn, K. & Coniglio, N. D., 2020. 'Sharing and cooperation in an experiment with heterogeneous groups', *Economics Letters* **197**, 109619.
URL: *https://www.sciencedirect.com/science/article/pii/S0165176520303797*

Bowles, S. & Gintis, H., 2002. 'Social capital and community governance', *The Economic Journal* **112**(483), F419–F436.

Brañas-Garza, P., Molis, E. & Neyse, L., 2021. 'Exposure to inequality may cause underprovision of public goods: Experimental evidence', *Journal of Behavioral and Experimental Economics* **92**, 101679.
URL: *https://www.sciencedirect.com/science/article/pii/S2214804321000197*

Buckley, E. & Croson, R., 2006. 'Income and wealth heterogeneity in the voluntary provision of linear public goods', *Journal of Public Economics* **90**(4), 935–955.
URL: *https://www.sciencedirect.com/science/article/pii/S0047272705000903*

Burns, J. & Keswell, M., 2015. 'Diversity and the provision of public goods: Experimental evidence from south africa', *Journal of Economic Behavior & Organization* **118**, 110–122.

Burns, J. & Visser, M., 2008. 'Income inequality and the provision of public goods: When the real world mimics the lab', *SALDRU Working Paper* .

Cappelen, A. W., Nielsen, U. H., Tungodden, B., Tyran, J.-R. & Wengström, E., 2016. 'Fairness is intuitive', *Experimental Economics* **19**(4), 727–740.

Carpenter, J. P., 2007. 'Punishing free-riders: How group size affects mutual monitoring and the provision of public goods', *Games and Economic Behavior* **60**(1), 31–51.

Chan, K. S., Godby, R., Mestelman, S. & Muller, R. A., 1997. 'Equity theory and the voluntary provision of public goods', *Journal of Economic Behavior & Organization* **32**(3), 349–364.

Chan, K. S., Mestelman, S., Moir, R. & Muller, R. A., 1999. 'Heterogeneity and the voluntary provision of public goods', *Experimental Economics* **2**(1), 5–30.

Cherry, T. L., Kroll, S. & Shogren, J. F., 2005. 'The impact of endowment heterogeneity and origin on public good contributions: evidence from the lab', *Journal of Economic Behavior & Organization* **57**(3), 357–365.

Cohen, J., 1988. *Statistical Power Analysis for the Behavioral Sciences*, Hillsdale, NJ: Lawrence Erlbaum.

Croson, R. & Gneezy, U., 2009. 'Gender differences in preferences', *Journal of Economic Literature* **47**(2), 448–474.

Eckel, C. C. & Grossman, P. J., 1996. 'Altruism in anonymous dictator games', *Games and Economic Behavior* **16**(2), 181–191.

Eckel, C. C. & Grossman, P. J., 2008. 'Differences in the economic decisions of men and women: Experimental evidence', *Handbook of Experimental Economics Results* **1**, 509–519.

Eckel, C. C., Priday, B. A. & Wilson, R. K., 2018. 'Charity begins at home: A lab-in-the-field experiment on charitable giving', *Games* **9**(4), 1–22.

Engel, C., 2011. 'Dictator games: A meta study', *Experimental Economics* **14**(4), 583–610.

Fehr, E. & Gachter, S., 2000. 'Cooperation and punishment in public goods experiments', *The American Economic Review* **90**(4), 980–994.

Fong, C. M. & Luttmer, E. F., 2011. 'Do fairness and race matter in generosity? Evidence from a nationally representative charity experiment', *Journal of Public Economics* **95**(5-6), 372–394.
URL: *http://dx.doi.org/10.1016/j.jpubeco.2010.07.010*

Grether, D. M. & Plott, C. R., 1979. 'Economic theory of choice and the preference reversal phenomenon', *The American Economic Review* **69**(4), 623–638.

Grossman, P. J. & Eckel, C. C., 2012. 'Giving versus Taking : A " Real Donation " Comparison of Warm Glow and Cold Prickle in a Context-Rich Environment', *Monash University, Department of Economics.* pp. 1–23.

Hargreaves Heap, S. P., Ramalingam, A. & Stoddard, B. V., 2016. 'Endowment inequality in public goods games: A re-examination', *Economics Letters* **146**, 4–7.
URL: *https://www.sciencedirect.com/science/article/pii/S0165176516302555*

Hofmeyr, A., Burns, J. & Visser, M., 2007. 'Income inequality, reciprocity and public good provision: an experimental analysis', *South African Journal of Economics* **75**(3), 508–520.

IMF, 2018. *Regional Economic Outlook, April 2018, Sub-Saharan Africa: Domestic Revenue Mobilization and Private Investment*, International Monetary Fund.

Junquera-Varela, R. F., Verhoeven, M., Shukla, G. P., Haven, B. & Moreno-Dodson, B., 2017. *Strengthening domestic resource mobilization: Moving from theory to practice in low-and middle-income countries*, World Bank Publications.

Kaplanova, P., 2016. 'Public goods as factors of a local economic development in slovakia.', *Administration & Public Management Review* (26).

Keser, C., Markstädter, A., Schmidt, M. & Schnitzler, C., 2014. Social costs of inequality: Heterogeneous endowments in public-good experiments, Technical report, University of Goettingen, Department of Economics.
URL: *https://EconPapers.repec.org/RePEc:zbw:cegedp:217*

Lehrer, K. & Porter, C., 2018. 'Charitable Dictators? Determinants of Giving to NGOs in Uganda', *Journal of International Development* **30**(1), 80–101.

Li, S. X., Eckel, C. C., Grossman, P. J. & Brown, T. L., 2011. 'Giving to government: Voluntary taxation in the lab', *Journal of Public Economics* **95**(9-10), 1190–1201.
URL: *http://dx.doi.org/10.1016/j.jpubeco.2011.03.005*

Lohse, J., Goeschl, T. & Diederich, J. H., 2017. 'Giving is a question of time: response times and contributions to an environmental public good', *Environmental and Resource Economics* **67**(3), 455–477.

Neill, H. R., Cummings, R. G., Ganderton, P. T., Harrison, G. W. & McGuckin, T., 1994. 'Hypothetical surveys and real economic commitments', *Land economics* pp. 145–154.

Ostrom, E., Walker, J. & Gardner, R., 1992. 'Covenants with and without a sword: Self-governance is possible', *The American Political Science Review* pp. 404–417.

Pereda, M., Capraro, V. & Sánchez, A., 2019. 'Group size effects and critical mass in public goods games', *Scientific reports* **9**(1), 1–10.

Piovesan, M. & Wengström, E., 2009. 'Fast or fair? a study of response times', *Economics Letters* **105**(2), 193–196.

Rand, D. G., Greene, J. D. & Nowak, M. A., 2012. 'Spontaneous giving and calculated greed', *Nature* **489**(7416), 427.

Rand, D. G. & Kraft-Todd, G. T., 2014. 'Reflection does not undermine self-interested prosociality', *Frontiers in Behavioral Neuroscience* **8**, 300.

Saadi Sedik, T. & Xu, R., 2020. 'A vicious cycle: How pandemics lead to economic despair and social unrest', *IMF Working Papers* **20**.

Starmer, C. & Sugden, R., 1991. 'Does the random-lottery incentive system elicit true preferences? an experimental investigation', *The American Economic Review* **81**(4), 971–978.

Tajfel, H., 1982. *Social identity and intergroup relations*, Cambridge University Press.

Tamai, T., 2022. 'Economic growth, equilibrium welfare, and public goods provision with intergenerational altruism', *European Journal of Political Economy* **71**, 102068.

Ubeda, P., 2014. 'The consistency of fairness rules: An experimental study', *Journal of Economic Psychology* **41**, 88–100.

Umer, H., 2020. 'Revisiting generosity in the dictator game: Experimental evidence from pakistan', *Journal of Behavioral and Experimental Economics* **84**, 101503.

World Bank, 2020. Global economic prospects, Technical report, The World Bank, Washington DC.

World Bank, 2021. 'South africa economic update, edition 13: Building back better from covid-19 with a special focus on jobs'.

Zelmer, J., 2003. 'Linear public goods experiments: A meta-analysis', *Experimental Economics* **6**(3), 299–310.

Zizzo, D. J., 2010. 'Experimenter demand effects in economic experiments', *Experimental Economics* **13**(1), 75–98.