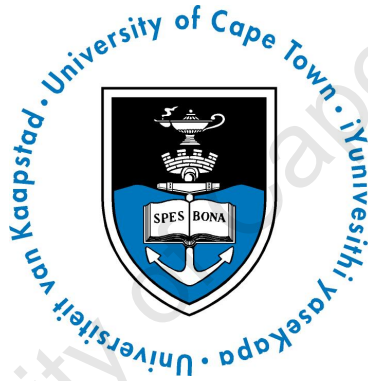


The Heritability of History

How inherited status affects cooperative behaviour in public goods games

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Abstract

The intergenerational transmission of inequality causes individuals to receive unearned advantages and disadvantages in society. Understanding how the transmission of unearned material status affects social interactions will help to illuminate how the relationship between material status and social connections affects an individual's overall welfare. The behavioural responses to intergenerational inequality have proven difficult to isolate in observational data. In a series of laboratory experiments, an inherited inequality framing was shown to cause significantly different public good game contribution behaviour for various types of individual. While inheritance status improved cooperation among those who inherited a high status in groups with only others who inherited high endowments, the inheritance frame is associated with reduced cooperation in unequal groups and in groups comprised of exclusively inheritors of low material status. The inheritance frame established a powerful historical context for participants, the reduction in cooperation caused by inherited inequality persisted even after redistribution interventions which eliminated the material inequality.

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1 Inequality and social division

Often some degree of inequality is tolerated in the belief that the richest will contribute large sums to public goods which improve the society (Kenworthy 2010). It is argued that the richest have an interest in improving public facilities in their communities, creating benefit for everyone who lives there. Yet rising inequality is increasingly a cause for concern globally, and especially in South Africa where inequality represents the legacy of Apartheid institutionalised discrimination. Piketty's pioneering work on inequality using historical tax data portrays inheritance income as a central driver of inequality in France over the past 200 years (Piketty 2011). While data limitations prevent similar analyses for other countries, the projected growth in the share of income attributed to inheritance has provoked calls for stronger inheritance taxation policy (Atkinson 2014, Piketty & Saez 2013).

In this dissertation a novel design for measuring the effect of inherited inequality on the provision of public goods in a lab setting is developed. The experimental design is implemented in an experiment with two stages. In the first stage, the interacting effects of inheritance status, material status and group inequality for average contribution to a public good are examined. This experiment tests whether inherited inequality is compatible with the provision of public goods. In the second stage, the effect of addressing inequality with two redistribution rules is considered. This experiment tests whether redistribution can shift contribution behaviour when there is a prior history of inequality. The results of these two experiments are used to reflect on the effects that intergenerationally transmitted inequality can have on individual behaviour and the implications of the triggered behaviours for the equity of social welfare and public good provision.

1.1 Evidence of the harmful and unfair aspects of inequality

Objections to inequality are often motivated by the evidence that more unequal societies are worse societies to live in on numerous metrics. A 2014 IMF study examining growth in 167 countries between 1960 and 2002 showed that after controlling for GDP level, growth was more rapid and was sustained for longer spells when income inequality after taxes and transfers was lower (Ostry et al. 2014). When a society is unequal, productive potential is concentrated in the hands of a small elite. Instead of converting this potential into societal wellbeing, the rich tend to purchase unproductive luxury goods and oversupply capital to investment markets. The result of this is that growth in top incomes has been shown to have little to no effect on the incomes of those at the bottom of the income distribution (Kenworthy 2010). Moreover, this shift in the distribution of incomes, with a declining share going to the middle class has been linked to growing indebtedness for the middle class. This growth in debt has been linked to financial crises by some researchers (Reich 2010). Theoretically, the wealthy are predicted to even use their riches to discourage inventions which may disrupt the industries they presently profit from (Boushey et al. 2017) and there is empirical evidence that rich parents attempt to hoard opportunities so that their skills are more exclusive and valuable, harming the education prospects of the poorest in unequal societies (Reeves & Howard 2013). Societies with income inequalities are also likely to manifest inequalities along other lines such as race and gender. For example, Schneider & Hastings (2017) find evidence that high status women in the United States outsource domestic labour to low status women, widening the class divide in time spent on housework.

There is robust evidence that unequal societies have higher propensities for violence and higher homicide rates (Moss et al. 2013, Deaton 2003). Research such as that of Fajnzylber et al. (2002) exemplify the accepted results in this sub-literature. They show that there is a strong relationship between the Gini index and the rate of violent crimes such as homicide and robbery across a data set including a number of countries from all major regions of the

world. The relationship persists when controls for regional effects, the percentage of young males in the population and police officers per capita are included in the specification, suggesting that the significance of inequality does not arise from a correlation with some other, unobserved determinant of crime. Kunst et al. (2017) find evidence that higher levels of inequality cause dominant groups to be more willing to endorse between group hierarchies. These “hegemonic” attitudes cause a higher prevalence of violence and social instability. Different types of inequality seem to cause different violent responses (Cramer 2003). Hillesund et al. (2019) show that economic inequality increases the risk of civil conflict, while political exclusion is more likely to trigger violence directed towards the state.

In more unequal societies, the disproportionate political influence of the rich skews public good provision to favour their preferences (Deaton 2003). Paired with a divergence of preferences between rich and poor which is more to occur likely under greater inequality, inequality is likely to result in the under-provision of public goods for the poor. Evidence of inequality undermining political institutions to the benefit of the wealthy is found by Glaeser et al. (2003). Campante (2011) shows that wealthy individuals donate more to presidential campaigns when income inequality at the county level is higher.

Wilkinson & Pickett (2018) argue that those living in more unequal societies have higher levels of anxiety because all members of the society are more concerned about their social rank. The anxiety manifests as a variety of mental health conditions such as depression and narcissism (Pickett & Wilkinson 2015). The supporting narrative that humans, as social beings, are strongly affected by social order is compelling and has a fair basis in evidence (Martikainen et al. 2003, Singh-Manoux et al. 2003). There is some evidence that the social rank which triggers adverse reactions is not based on the income distribution. In the Whitehall studies discussed in Marmot (2002) and Martikainen et al. (2003), the self-perceived health and depressive symptoms of British civil servants are analysed. The civil servants’ health is shown to be better as a result of them having a higher employment

rank. In regression analysis, income is insignificant when employment rank is included in the specification, suggesting that conditional on rank, income provides no additional information about the relationship. Thus, variation in health is better explained by occupational rank than by absolute income. This is true at all levels of the hierarchy, suggesting this is not a question of threshold, even those very close to the top suffer from being lower in rank than those above them. Crucially, all British civil servants are well above the poverty line, meaning that the rank measure used in the study will not be artificially significant as an indicator of low income in absolute terms.

Low social rank implies reduced control over critical aspects of life. There is evidence that a lack of control triggers a stress response at the chemical level and there are biochemical pathways which link control to health (McEwen 1998). It is intuitive that there may be other social mechanisms through which control may cause worse welfare, for example, for where you live or who you associate with. In a review of the epidemiological literature Deaton's (2003) review finds that non-income inequalities such as racial or residential inequality are associated with significantly worse health outcomes. Empirical studies and reviews have found that much of the correlation between income inequality and health indicators in rich countries is explained by individual incomes and racial inequalities (Lynch et al. 2004, Deaton & Lubotsky 2009). Even when income inequality does not cause a harmful social reaction, a redistribution from wealthier to poorer individuals can have an overall positive effect on public health¹ (Deaton 2003) for investments which have diminishing returns to income. However, where social rank matters for social welfare, the optimal policies for improving welfare will be less concerned with redistribution, which is usually rank preserving, and rather focus on rank eliminating strategies such as widespread education (Martikainen et al. 2003).

A second class of criticisms of inequality argues that more unequal societies are more

¹Although this assumes no general equilibrium effects from the redistribution

unfair. In more unequal societies, merits are less closely related to success than in more equal societies (Samson et al. 2002). Moreover, unequal societies are argued to be more unjust because unequal societies have lower social mobility (Hassler et al. 2007, Corak 2013), implying that in more unequal societies individuals are less likely to earn what they deserve. In societies with low mobility, individuals do not earn their position or income through effort, rather, they passively receive them from their parents. Most objectionable are the advantages that arise as result of circumstances as opposed to skills and are transmitted from parent to child (Roemer 2004). Circumstances are beyond the control of the affected individual. It is pure luck where and to which parents an individual is born. Thus, in an unequal society people are not rewarded according to their skills or efforts and some enjoy large, arbitrary benefits. By contrast, inequalities which arise from an individual's own efforts are considered earned and therefore more just (Roemer 2004). Intergenerational inequality is especially representative of this injustice because children's position and prospects are determined by the position of their parents.

Many studies have measured intergenerational mobility by estimating an intergenerational earnings elasticity as the coefficient on a logarithm measure of child's earnings when regressed on the logarithm measure of parent's earnings. The surfeit of studies using this method enable some remarks about the relative mobility in different countries. Countries like the United States and United Kingdom have fairly high intergenerational persistence, with intergenerational correlation coefficients estimating that more than 30% of children's lifetime earnings is explained by parental earnings (Solon 2002, Blanden et al. 2005). The intergenerational correlation coefficients for Canada, Sweden and Finland are all much lower at around 15% (Hassler et al. 2007, Blanden et al. 2005). In South Africa, earnings is shown to be strongly persistent over generations relative to other countries with an intergenerational earnings elasticity of around 60% (Piraino 2012). This figure is comparable to other developing countries like Brazil and China in its high-inequality, low-mobility status (Piraino 2012). In sum, mobility-related concerns have also drawn public attention towards

addressing inequality.

These two strands of argument explain how inequality affects welfare through mechanisms that are distinct from those caused by absolute poverty, warranting independent attention. The concerns discussed above suggest that particular attention should be paid to the sources of inequality which harm social welfare and undermine individuals' ability to access justice.

1.2 Inherited advantage as a source of unfair inequality

Advantages passed from parents to children are entirely unearned by the child. For this reason, inherited advantage is seen a particularly objectionable source of material inequality (Bowles & Gintis 2002). There are a number of avenues through which parents could transmit advantage (and disadvantage) to their children. The intergenerational earnings elasticities discussed in the previous section do not establish how parents' lifetime earnings translate into the lifetime earnings of their children. Decomposition methods are used to establish the drivers of intergenerational mobility, aiming to illustrate areas of potential for policy. The mechanisms which transmit earning capacity from one generation to another most commonly discussed and researched are summarized in this section.² The relative importance of unearned mechanisms of transmission suggest that frequently the observed intergenerational persistence is a result of unfair processes. The three most prominent mechanisms for intergenerational earnings transmission are the transfer of genetically heritable traits, socio-political arrangements and financial transfers and purchases.

When investigating the importance of genetic traits such as cognitive ability, race, height and disease susceptibility, Bowles & Gintis (2002) find that genetics are the most important known mechanism for intergenerational transmission in the United States. (Blanden et al.

²In the following discussion, many of the studies limit their analysis to the relationship between fathers and sons. This is partly because the quality of income data for the current generation's mothers is limited by poor data collection and small sample sizes. Moreover, studies generally find that persistence is strongest from fathers to sons (Bowles & Gintis 2002).

2007) find that genetic transmission can account for around half of Britain's intergenerational elasticity. Additionally, they establish that the relevant genetic material is primarily non-cognitive. IQ does little to explain persistence, while race explains a large proportion of the earning status transmitted from fathers to sons. This suggests that traits that do not matter for productivity are transmitting earning capacity across generations.

Beliefs, preferences, aspirations and group membership are shaped by upbringing and where an individual happens to be born. This mechanism of intergenerational transmission is relatively under-explored (Bowles & Gintis 2002). Fatalism (Bowles & Gintis 2002) and trust (Cesarini et al. 2008) have been shown to have a negative effect on earnings and to be transmitted from parents to their offspring. Similarly, parents have been shown to communicate their working experiences to their children, encouraging the type of behaviour expected of their work position to their children (Kohn 1989) and transmit group membership, such as church attendance (Yeung et al. 2000) and occupational choice (De Graaf & Kalmijn 2001), and the corresponding advantages and opportunities, to their children. Environmental factors transmit advantage through health outcomes and local public policy. Health inequalities are often transmitted by income. For example, being unable to afford expensive treatments, living in low-quality housing with damp or ineffective insulation and poor nutrition (Deaton 2013). An example of public policy transmission is illustrated by the extremely low mobility in Apartheid South Africa. The inherited trait of race was extremely important for persistence because of the government policies which explicitly favoured white people (Bowles & Gintis 2002). Thus, being born in the same racist society as their parents caused children to inherit their disadvantaged position.

Wealth and income transmitted in the form of inheritance and inter vivos gifts and payments comprise a major source of income for children of the very wealthy, yet are relatively unimportant as an income source for the bulk of families (Bowles & Gintis 2002). Differing behavioural responses from rich and poor recipients of inheritance also cause inequality to

be transmitted (Elinder et al. 2018). While the rich save and invest their inheritance, the poor are more likely to consume bequests. Parental income shocks are shown to have lasting adverse effects on children, being linked to reduced schooling performance and attainment (Black & Devereux 2010, Duryea et al. 2007). Skills and education are communicated from parents to children directly and indirectly through the education opportunities parents purchase for their children. To the extent that skills and education are socially productive, these sources of immobility might be less objectionable. However, credit constraints are likely to limit the capacity for poor parents to invest in the skills of their children (Blanden et al. 2005). Studies have shown that education policy has the potential to improve mobility (Hassler et al. 2007, Reeves & Howard 2013, Finn et al. 2016) by broadening access for the poor. A paper which studied 21 small scale societies finds that in communities where wealth is more important and more easily transferable, there is greater transmission of wealth (Mulder et al. 2009). Moreover, parents transmit the resource that is most advantageous to their children for their society. Despite these general trends, the analysis shows the level of inequality in a society can be managed by political, social and institutional arrangements. For instance, a norm of funeral feasting among some pastoralists in Madagascar redistributes wealth, limiting the capacity for heritable wealth to be transmitted.

Although the range of mechanisms for intergenerational earnings transmission discussed above illustrate that not all sources of intergenerational inequality are equally cause for concern, many of those that are shown to be important are the result of circumstances rather than efforts or choices (Roemer 2004). Thus, large components of intergenerationally transmitted income are the result of luck, implying that the resulting distribution is not fairly determined. The mechanisms which transmit inequality intergenerationally are complex and not yet fully understood. There is some evidence that the behaviour of inheritors affects whether or not bequests promote equality or inequality, however how individuals are likely to respond to bequests is not well understood and has rarely been directly studied.

1.3 The relationship between economic division and social division

In addition to individual effects, inequality can undermine collective welfare by causing increased social division. The discussion above alludes to the importance of social interactions as a mediator of inequality and adverse outcomes. Inequality can be shown to hinder social cooperation, increase competition between groups and cause preferences to diverge (Baland & Platteau 1997, Thorbecke & Charumilind 2002). Social division is likely to drive increased inequality as excluded groups lose social and political influence and support (Glaeser 2005). Thus, understanding how to promote more co-operative and equitable societies has the potential to create sustained social benefit.

Higher levels of inequality have been linked to lower levels of social cohesion by researchers.³ Lower levels of cooperation have been linked to increased inequality and reduced macroeconomic growth (Knack & Keefer 1997, Zak & Knack 2001). Lancee & Van de Werfhorst (2012) show income inequality reduces civic participation even when individual income is controlled for. Moreover, Kawachi et al. (1997) show that in more unequal societies individuals under-invest in social relationships. Inequality is also linked to lower levels of trust, an important element of social cohesion. Reductions in trust driven by income inequality have been found to increase the prevalence of homicide (Elgar & Aitken 2010), corruption (Rothstein & Uslaner 2005) and other violent crime (Halpern 2001, Kennedy et al. 1998). Moreover, higher levels of trust have been linked to increased provision of social protection policies (Rothstein & Uslaner 2005) and stronger institutions (Easterly et al. 2006). Inequalities or divisions driving distrust and lower levels of social cohesion may occur along lines other than income. There is a strong consensus that ethnic and linguistic heterogeneity cause lower levels of social cohesion (Leigh 2006, Reitz & Banerjee 2007). The social attitude to inequality may also differ depending on the type of inequality and the source of that inequality, with some inequalities considered more deserved than others (Bowles &

³These studies measure cohesion using indicators of social engagement, trust and group perceptions.

Gintis 2002).

Social cohesion is a valuable policy goal. Empirically, social cohesion has been linked to increased participation in the labour market (Beauvais & Jenson 2002) and stronger macroeconomic performance (Easterly et al. 2006). Greater social cohesion is associated with lower rates of violence and better conflict resolution (Langer et al. 2017). Social cohesion has been linked to democratic participation and social inclusion (Burns et al. 2018). Qualitative links between social cohesion and tolerance, social solidarity and quality of life have also been established (Pavanello et al. 2016). Thus, reductions in inequality that promote increased cooperation can trigger virtuous cycles of welfare improvement.

Some studies examining cohesion highlight the importance of absolute incomes for trust. An analysis of trust among a sample of Western countries found that when controlling for GDP per capita wealthier countries enjoy higher generalised trust, with inequality having no significant effect (Steijn & Lancee 2011). Similarly, in a study of Australian neighbourhoods, wealthier areas were found to be more cohesive and inequality had no significant effect on the level of trust (Leigh 2006). When absolute incomes determine trust levels, there will be inequalities in the level of cooperation possible for the rich as opposed to the poor. In this way, inequalities in the level of trust that are correlated with income can also cause further adverse affects for the poor.

The relationship between income, inequality and cohesion depends on the perceptions and attitudes of the community concerned. This is because individuals form the beliefs which motivate their actions on the basis of perceptions. Naturally, perceptions are influenced by experience, but they are also filtered by cognitive biases and social narratives (Langer et al. 2017). In some countries, wealth may be perceived to be more divisive, yet in others, differences in wealth may have more cultural significance. In all cases, the effect of shifts in the distribution of material resources is difficult to measure in observation data. This is primarily because beliefs about the income distribution and the relative importance of

different features of the income distribution are difficult to isolate and observe. Additionally, it is likely that causation for some of the outcomes discussed above runs both ways. For example, it is plausible that better institutions would foster trust between citizens in addition to trust enabling the creation of better institutions. Experimental studies can be used to examine human behaviour without having to account for the many confounds present in observational data, enabling a clearer discussion of the causal relationship between cohesion and welfare outcomes.

2 Experimental evidence of attitudes to inequality

Analysis of the relative importance of the various mechanisms of transmission presented in Bowles & Gintis (2002) highlights that much of the intergenerational transmission of advantage remains unexplained. Bowles & Gintis (2002) are able to explain about a quarter of the correlation between the labour market earnings of fathers and sons. The degree to which intergenerational transmission remains unexplained is partly an issue of data. Many factors relating to behaviour cannot be isolated in observational data and many determinants are inter-related so that their effects are difficult to isolate such that attempts to isolate causal effects rely on strong assumptions (Black & Devereux 2010). Attempts to measure the relationship between inequality and social cooperation with observational data confront similar difficulties. Moreover, collecting data on intergenerational dynamics takes a long time and few quality data sets which span multiple generations presently exist. The dearth of data on inheritance income makes analysing how inherited inequality affects behaviour very difficult outside of the lab.

Moss et al. (2013) argue that differing inequality levels in varied institutional settings may cause very different effects, meaning that aggregate studies will struggle to identify a

consistent causal effect ⁴. Moss et al. (2013) argue that laboratory experiments of behaviour have the potential to be especially illuminating in this regard, allowing researchers to vary the context and extent of inequality experimentally while examining the propensity for behaviours or biases arising from inequality while all else is held constant. The clearly defined payoffs that are characteristic of games used in experimental economics enable researchers to unambiguously determine which intervention individuals are responding to and test which motives best explain the behaviour.

Thus, the lab offers methods which are promising for understanding how inherited inequality interacts with behaviour. The controlled nature of the lab means that the reference group a player compares themselves to is clearly defined. Experimenters are able to vary the information participants have and control for all elements in the information set in regression analysis. Results from the lab can explain the causal mechanisms that are much more challenging to establish in survey data and can motivate adjustments in survey methods to better target tests of the behaviour observed in experimental studies.

2.1 Inequality aversion and destructive behaviour

Experimental evidence suggests that people are generally averse to inequality. However, the negative emotions triggered by inequality can be shown to cause destructive behaviour and an increased tolerance for lower absolute welfare. This can explain why inequality is associated with undesirable social and political outcomes rather than cooperative attempts to reduce inequality.

In economic bargaining games in which individuals must decide how to split an endowment between two players, there is a well-documented tendency players to forgo some personal

⁴For example, individuals may react positively to moderate inequality, but negatively to extreme inequality and respond to inequality arising from perceived hard work very differently to inequality arising from rent-seeking or corruption

monetary gains in order to share the endowment more equally with the other player (Bowles 2016, List 2007). Recipients of extremely inequitable divisions generally opt to receive no additional payoff instead of a low but unequal amount Thaler (1988). Individuals frequently reject Pareto superior bundles of income in which their bargaining partner receives a higher payoff than they do in favour of equal divisions (Clark & D'Ambrosio 2015). This suggests that individuals are willing to destroy large benefits to others and forgo incremental benefits for themselves in order to promote equality. Clark & D'Ambrosio (2015) interpret the tendency for players of these games to deviate from the strategy which would maximise personal returns in favour of offering more to another player as evidence of inequality aversion. These general tendencies vary contextually. In dictator games where one player has complete control over the allocation, the division of endowment tends to be more unequal than games where the two players interact suggesting that institutional inequality is likely to be inequality-reinforcing and that the institutional setting affects preferences for equitable distributions. Inequality aversion is found to be increasing with age and decreasing with education level (Güth et al. 2007, Fehr et al. 2006). Repeated play bargaining games show that inequality aversion decays over time (Armantier 2006)

Inequality aversion can be investigated by surveying preferences for the distribution and redistribution of income.⁵ Respondents answering questions about individuals preferences for their grandchildren, or from under the veil of ignorance,⁶ are tolerant of lower mean earnings when in distributions with lower inequality (Carlsson et al. 2005). In 'leaky bucket' experiments participants are asked how much leaked or 'lost' money they would tolerate in a transfer from a richer individual to a poorer individual. This loss is explained as an administrative cost. On average respondents are not very supportive of these transfers (Amiel et al. 1999). This implies a relatively low inequality aversion, or a reluctance to incur costs in order to transfer income from the rich to the poor. Individual characteristics matter for how

⁵However, this method of eliciting preferences is not incentive compatible, so individuals may indicate a preference that does not correspond to how they behave in reality.

⁶The perspective of an impartial, self interested individual

respondents feel about the redistribution. Poorer individuals are more supportive of leaky bucket transfers than richer individuals. Together these two attitudes suggest that although people prefer more equal societies even when those societies have lower average wages, there is much less support for costly transfers from rich people to poor people. This implies that the methods used to address inequality matter for how much support they garner.

In a game which gave participants the ability to ‘burn’ the income of other players, both wealthy and poor individuals were found to be very willing to destroy the income of others. The decision to burn someone else’s income is thought to represent their aversion to that distribution of income. Zizzo (2003) argues that this experiment design isolates the effect of envy, illustrating the potential for envy to be economically destructive. Studies using this mechanism found that the rich burned a larger amount of money, although rich and poor players have statistically equal propensities to participate in burning of others’ money (Zizzo 2002). In this study the extent an individual’s income was burnt was determined by how close to the top of the income distribution they were, suggesting a desire to reduce the extent of inequality. Moreover, when inequality is created arbitrarily at the start of the game, those given the arbitrary advantage were particularly targeted to have their income burned. Together these results suggest that envy is prevalent in unequal societies and is more prevalent in unequal societies where its members consider the inequality to be unfair. In a study by Fehr (2018) in which inequality is generated through a piece-rate wage for completing a task, burning was substantially higher in treatments which allowed participants to misrepresent their effort level and claim the reward corresponding to the inauthentic effort level when compared to inequality create purely from the remuneration of actual effort. A joy-of-destruction game, in which all players have equal endowments and are given the opportunity to burn income, was conducted in Namibia by Prediger et al. (2014). The study found that communities exposed to higher levels of poverty and resource constraints exhibited more anti-social behaviour as measured by the destruction of the endowment of their game partner.

Aversion to inequality is not symmetric.⁷ There is evidence that tolerance of favourable inequality is greater than the tolerance for unfavourable inequality (Goeree & Holt 2000, Fehr & Schmidt 1999). A study using Chinese data discussed in Clarke & D’Ambrosio (2015) finds that perceived position on the income distribution affects attitudes towards inequality. Top earners are happier as a result of inequality and bottom earners are less happy when they perceive inequality to be greater.

The experimental literature has an emerging consensus that the source of inequality matters for how individuals react to it. Unearned inequality is tolerated less. Younger, poorer and more educated people appear to be more averse to inequality. Moreover, there appears to be a fairly high tolerance for policies which promote equality by destroying the advantages of others. While individuals are willing to forgo some personal benefit for the sake of more equitable distributions of income, they are adverse to “wasteful” and policies which harm their own position in the distribution. The evidence of a general aversion to unfair inequality suggests that unequal societies are generally less preferable than more equal ones. Inequality aversion may also explain some of the destructive behaviours observed in more unequal societies. It is likely that the destructive behaviour reduces cooperation, a possibility that is examined explicitly in the following section.

2.2 Social interactions in public good games

Public goods games are particularly useful experiments for simulating community interactions. In a public good game, a number of players are allocated to a group (often four per group) and each given an amount of money, referred to as their “endowment”. Players then choose how to allocate their endowment, selecting how much to contribute to a public pool and how much to save in a private account. The public pool is increased by a growth factor

⁷Although there is evidence from MRI scans that any inequality-reducing transfer stimulates a neural reward response (Tricomi et al. 2010).

and shared equally among the group members. Contributions to the public pool indicate a willingness to work with the others in the group to generate mutual benefit. This interaction relies the expectation that the other group members will contribute enough to the public pool such that you profit from contributing to the public pool instead of keeping your endowment in your private account. One interpretation of public good games used in experimental economics is that they measure social cohesion (Anderson et al. 2004), where groups that are able to successfully generate public goods together are more cohesive than groups whose contributions fail to generate meaningful returns from the public pot.

In public goods games experiment participants are found to contribute between 40 and 60 percent of their endowment to the public good, resulting in positive earnings from the public good for participants (Chaudhuri 2011). The level of contribution to the public pool unravels over repeated interactions although average contributions remain well above zero (Bowles 2016). This result implies a willingness to create social benefit from private income, although communities struggle to sustain the mutually beneficial provision of public goods the more they interact with one another. When public goods games include the ability to punish other participants, participants are found to be willing to incur costs equal to the punishment to punish those who are not “cooperating” by contributing their fair share to the public pool. Both punishments and communication mechanisms can be used by players to promote greater cooperation. When public good games are played with the ability to punish or communicate with other players, average contributions to the public pool increase substantially (Bowles 2016). This illustrates a desire and willingness to punish those who create inequality by free riding on public enterprises.

There a number of studies which examine how an unequal distribution of endowments affect contribution behaviour in public good games. At present there are not enough studies to establish any stylised facts about public good game behaviour when endowments are unequal. In some studies inequality is found to have no effect on the provision of public

goods. Hofmeyr et al. (2007) and Cherry et al. (2005) find that players contribute the same fraction of their endowment independent of the level of inequality between players.

Other research suggests that high types respond to inequality by reducing the amount they contribute. Heap et al. (2016) find that high endowment players contribute larger proportions of their endowment when playing the public good game in groups with an equal distribution of endowments as compared to when high endowment players are in groups which have an unequal distribution of endowments. Meanwhile, low and medium endowment players contribute the same proportions of their income whether there is endowment inequality or not. The authors interpret this result as evidence that the rich may become more resistant to taxation in societies with greater inequality. Several studies find that individuals in groups with heterogeneous endowments contributed less to the public pool on average independent of their relative endowment amount, resulting in lower levels of public good provision for those groups relative to homogeneous endowment groups on average (Cherry et al. 2005, Anderson et al. 2008).

Some studies find that some players increase their contribution amounts in response to inequality. A study in fishing communities in South Africa analysed participants behavioural response to endowment inequality in a public goods game with punishment. In the stages before punishment is introduced, those with low endowments contribute significantly larger proportions of their endowment than than high endowment types (Burns & Visser 2006). The authors of the study hypothesize that this behaviour is an attempt to induce more generous contributions from high endowment players. In the punishment stages of the game, high endowment players were punished substantially when they contributed below the mean contribution. Beyond this, rich players were punished more overall, apparently in an attempt to reduce inequality in the earnings from the game. Once punishment is introduced, low endowment players moderate their tendency to over contribute to the public pool. Similarly, (Maurice et al. 2013) find that low endowment players over contribute to the public pool

when playing in groups with heterogeneous endowments. When public good games are played under a competitive frame, contributions increase relative to non-competitive public good games. However, a study by Heap et al. (2015) found that endowment inequality eliminates the gains from competition. When endowments are distributed extremely unequally, all contributions are reduced, especially those of high endowment players. When inequality is more moderate, distributed in a ratio of 60:40, low endowment players increase their contributions relative to equal groups. This increase in effort among low players disappears at high levels of inequality. A study conducted by Sadrieh & Verbon (2006) finds that players with relatively lower endowments are more prone to co-operating than richer players, and this effect is similar for all degrees of inequality. They show that players are generally neutral to inequality and that when inequality is extremely unequal the study finds a significant increase in “sabotage” actions. The authors attribute the general reluctance to employ sabotage as an attempt to overcome the social friction caused by inequality.

Most public good experiments examining inequality analyse “windfall” endowments, determined by some randomised allocation to varied treatment conditions. A small number of researchers have investigated the effect varying the endowment allocation mechanism which determined the endowment distribution for groups playing the public good game.

In a study which compared windfall endowments to endowments allocated to correspond to the real life wealth status of participants, wealthy individuals contributed more to public goods when their endowment corresponded to their actual wealth status than when their endowments were allocated randomly (Georgantzis & Proestakis 2011). Additionally, when both rich and poor individuals received endowments corresponding to their wealth status, rich individuals contributed more than poor individuals. Thus, Georgantzis & Proestakis (2011) find that higher public good contributions in unequal groups are driven by larger contributions from high endowment types when endowments correspond to real-world material status. In the study, informing participants of their distribution and determining

mechanism of endowments for their group reduced average contributions to the public pool. Cardenas (2003) find that those with lower real world material status are more cooperative in public good games, especially when playing with individuals they are more closely socially connected to.

In studies comparing endowments earned as a function of correct answers on a quiz relative to endowments allocated randomly, the endowment allocation method was found not to matter in repeated public goods games (Cherry et al. 2005). However, recipients of earned endowments behaved significantly differently to windfall endowment recipients in unequal groups when playing a one shot public good game (Kroll et al. 2007). Those who earned their high endowments are less generous in their contributions to the public pool when they play in heterogeneous groups. Kroll et al. (2007) attribute this behaviour to stronger preferences for fairness when endowments are allocated by the “earned” mechanism. In a study examining social exclusion, endowments for the public good game were determined by the outcomes of a prisoner’s dilemma game (Njozela et al. 2018). In the prisoner’s dilemma stage, some players had their strategies chosen for them, removing their agency in the endowment earning process. Players whose strategies were chosen for them in the endowment generating process contributed significantly less to the public pool than players in the control and players who were free to chose their strategy in the prisoner’s dilemma. This was true for all endowment levels.

Both inequality and the source of the inequality in public good games have been shown to affect the level of public good provision. This suggests that intergenerationally transmitted inequality is likely to trigger different reactions than other kinds of inequality. This possibility is worthy of investigation. If intergenerational inequality is considered unearned, this may have negative implications for social cooperation. Moreover, it appears that inequality aversion is not a strong motivator in public good games. Under endowment heterogeneity inequality aversion should result in players contributing their full endowment to the

public pool, which is rarely observed. Instead, it appears that inequality triggers mixed reactions, causing a reduction in cooperation for significant sub-populations. Understanding what elements of inequality reduce cooperation is essential for promoting more equitable distributions.

3 Theories of motivation in unequal societies

The intention of public goods experiments in the lab is to elicit the public good contributory preferences of participants. Theory predicts that heterogeneous communities will under provide public goods because the heterogeneity will cause individuals to differ in their preferences for public good provision (Fisher et al. 1995, Alesina & La Ferrara 2000). This section will examine some of the factors most likely to determine those preferences. A number of theories have been advanced to explain what motivates the contributions to public goods. It is possible that multiple motives are present simultaneously and may act to reinforce or negate one another. Bowles (2016) shows that economic games with the same incentives trigger different behaviours when framed differently. Similarly, Fehr & Schmidt (1999) argue that the economic environment determines which motives dominate for any particular choice. As such, it is likely that context could strengthen or weaken the motivating power of the following effects.

3.1 Efficiency or profit

If monetary payoffs are the primary concern of participants, they should follow the strategy that maximizes the financial returns. Theorists have developed two dominant predictions for optimal play in the public goods game.

The first prediction is the Nash equilibrium. In a Nash equilibrium, all players play their

optimal strategy given the strategies of the other players. In other words, no player can unilaterally change their strategy and be better off. In a public goods game, the optimal strategy is determined by the relative payoffs to investing in the private account or the public account. The traditional public goods game has a payoff for the individual of one unit for each unit of currency invested in the private account.⁸ Meanwhile, the payoff for the individual for one currency unit invested in the public account is half a currency unit. Thus, the Nash equilibrium strategy for all players is to invest nothing in the public account, putting their full endowment in the private account. By contrast, the public payoff for a unit invested in the public account is two currency units. This illustrates the social dilemma. The socially optimal strategy is for each participant to invest the full endowment in the public account, which would result in each player earning twice their endowment amount. However, the Nash strategy is that all players all players invest only in their private accounts and earn their endowment amount.

As has already been discussed, lab experiment participants are consistently found to contribute well above their Nash strategy. In single shot public good games, the average contribution to the public pool is around half the endowment amount. In repeated games, the average contribution decays, tending closer to the Nash of public pool contributions of zero. As discussed in Andreoni (1988), the observed behaviour has two possible explanations. The first is that players only become aware of the optimal strategy through repeated interactions with the other players in their groups. Thus, the decay in contributions is observed as players begin to adopt the Nash strategy. The second theory outlines an alternate rational optimal strategy. In repeated play, individuals may use their strategy in the current round to signal their planned strategy for future rounds to the other players in their group. If an individual contributes to the public pool, they signal to the other players in their group that they do

⁸For alternate payoff structures, the Nash strategy may be a non-zero contribution. There are even some designs where the Nash strategy is the observed experimental response. However, studies with non-zero equilibria frequently observe players contribution amounts greater than the Nash, with decay in contributions in repeated play.

not know the optimal strategy. As the payoff structures show, an individual's contribution to the public pool is a positive payoff for the other players. Thus, it is in a player's interests to induce the other players to contribute to the public pool. This may explain why a rational player deviates from the Nash prediction in repeated play. In doing so, they conceal both the optimal strategy and their knowledge of the optimal strategy. Contributing an amount more than the Nash in early rounds is likely to induce other players to contribute to the public pool. This strategy is less useful in sequential rounds as there are fewer future rounds to induce contributions in others. Thus, as the series of rounds progresses, players switch from contributing to the public pool to playing the Nash. This is consistent with the observed decay in contributions.

The evidence does not fully support either of these theories. In experiments where a number of public good games are played and participants are then informed of a second series of public good games, players are shown to 'reset' their contribution levels to amounts closer to their contributions in early rounds. This suggests players have not learnt the Nash strategy in the first stage, if they had, they would have no reason to deviate from in the new series of games. However, experiments by (Andreoni 1988) show that on average players contribute more to the public pool when matched with new participants in each round of play. In other words, players contributed more when there was no possibility of personal gain in subsequent rounds. This suggests players were not attempting to induce others to increase their contributions.

Andreoni (1988) speculate that players may be motivated by monetary payoffs. When matched with the same people in subsequent rounds, players gain more information from the interaction and so are better able to adjust their strategy in subsequent rounds. The increased decay trend when matching groups are held constant is consistent with this. Another possible explanation is that players wish to use punishment to deter players from deviating from the social optimal strategy. In this account, players have no reason to withhold their

contributions as punishment when there is not repeated play. Both of these theories suggest financial motivation, but imperfect strategies. A third possibility is that players' preferences include preferences for some non-monetary outcomes. Non-monetary preferences will be discussed in the following section.

3.2 Reciprocity, Trust and Fairness

A range of evidence in behavioural economics has established that social preferences are an important element of decision making. An individual may be willing to forgo material benefit in favour of affirming their commitment to altruism, reciprocity or some other conception of justice (Bowles 2016). For the purposes of this section, social preferences are preferences which concern the material payoffs of others.

Results from experimental economics offers evidence that trust is an important motivator. In trust games, the experimental regularity is that players exhibit a willingness to engage in transactions that rely on trusting others (Bowles 2016, Johnson & Mislin 2011). A willingness to transact in trust exchanges is regularly found to be reciprocated with generous return transfers (Bowles 2016). Behaviour in public good games is consistent with players exhibiting both trust and reciprocity. Initially, public good game contributions are around half the endowment amount. In repeated play, players reciprocate observed behaviour, reducing their own contributions when other others fail to contribute (Bowles 2016). Research which examines public good strategies conditional on the behaviour of others find evidence that a sizable proportion of players adopt a 'conditional cooperator' strategy (Fischbacher et al. 2001). Conditional cooperators adjust their contributions to the public pool to match the contributions of the other players in their group. This is consistent with a reciprocity interpretation of behaviour. Increased levels of trust as measured by a social values scale accurately predict increased contributions in a public goods game (Parks 1994, Kocher et al.

2015).

Some researchers define a preference of fairness as equivalent to inequality aversion (Fehr & Schmidt 1999), a social preference which has already been discussed extensively in this review. However, fairness includes broader behaviours than simply acting to minimise inequality. Rabin (1993) presents a discussion of fairness that incorporates treating people who perform acts of kindness well and punishing those who act unkindly. One interpretation of the behaviour observed by conditional cooperators is that they reciprocate the behaviour of their other group members. This could be interpreted as a preference to be treated fairly. In variations of the standard public goods game, fairness preferences can explain variation in contribution behaviour even in cases where inequality does not matter. Inequality generated by unfair processes is found to reduce public good contributions (Cherry et al. 2005, Kroll et al. 2007, Njozela et al. 2018). Perceptions of social exclusion drive lower average contributions to public goods (Candelo et al. 2017). In a public good experiment run in the Western Cape province, participants were shown to adjust their contributions to follow a fair share rule, matching the fraction of endowment they contribute to the public pool to the fraction of endowment contributed by others (Hofmeyr et al. 2007). In a field experiment which examined the behaviour of Brazilian fishermen, being involved with developing the management of a public good increased willingness to contribute to the public pool (Cavalcanti et al. 2010).

In public good games, an individual may be cooperating in the provision public goods with people of a shared identity or people of a different identity. Increased contributions in groups where participants share an identity can be thought of as representing identity solidarity, or within group cohesion. Increased contributions in groups where participants have varied identities can be interpreted as generosity, or between group cohesion.

3.3 Cognitive biases and altered preferences

Inequality is a distributional feature. This implies that attitudes about inequality are concerned with the position of individuals on a distribution of material welfare and with the gaps between individuals. Thus, cognitive cues based on an individual's relative position in a society may be affected by inequality and shift patterns of behaviour in unequal societies.

In public good games there is some evidence of self-serving bias among the respondents in the conditional contribution study. Fischbacher et al. (2001) find that individuals negatively deviate slightly from matching the contributions of the others in their group. This implies that even among those who exhibit relatively powerful social preferences, there is a tendency to favour one's own interests. Loughnan et al. (2011) show that societies with a more unequal distribution of income have higher average tendencies toward "self-enhancement". Self enhancement is the biased tendency to evaluate oneself as better than the average person. The authors of the study suggest that unequal societies may increase the salience of social status and encourage competitive behaviour driven by a desire to gain a position superior to others in social hierarchy.

According to relative deprivation theory, an individual with a certain level of income will be happier in society where their income is high relative to others than in a society where their income is low relative to others. A number of studies have linked rising incomes of others to reduced life satisfaction and welfare. Clark & Oswald (1996) show that workers report lower job satisfaction when their wages are lower than the average individual with shared characteristics. In an experimental setting, Clark et al. (2013) find that effort is negatively correlated with other's incomes and positively correlated with the individual's rank in the income distribution. Undurraga et al. (2016) find that cash grants to individuals of a low rank in a community cause those of a higher rank in the community to experience more stress as a result of increased work. The authors attribute this to an attempt among

the better off to preserve their social rank. Daly et al. (2013) find that for a given income, individuals' suicide risk rises with the incomes of others with common characteristics. The evidence points towards an aversion to being a low ranking member of a society. There is even evidence that low-rank aversion can cause more risk-loving behaviour. Kuziemko et al. (2014) show that bottom ranked individuals accept lotteries that may shift them to a higher rank that they reject at all other ranks. Bowles & Park (2005) show that in more unequal countries, average working hours are longer, which the authors attribute to "Veblen effects", an attempt among the middle and working classes to keep up with the consumption of the very rich.

The studies discussed above which examine responses to relative position assume that people are judging their welfare relative to the average person who shares their characteristics. There is some evidence that the process by which people evaluate their relative welfare is more complex than this. Critically, the process of establishing a reference relies on perceptions of who is in the reference group and how they are performing (Van Praag 2011). Delhey & Kohler (2005) show that reference points may be national or international and that people who feel deprived relative to other countries experience lower life satisfaction (Delhey & Kohler 2005). By contrast those who feel relatively better off compared to others do not enjoy increased life satisfaction.

Making inequality salient is likely to shift cognitive patterns and behaviour. There is some evidence to suggest that inequality causes individuals to be more self-serving. Moreover, when inequality is salient, those who are relatively lower are more likely to be dissatisfied and more willing to take extreme action to rectify their low rank. It seems plausible that this preference against being of a low social rank will translate into a demand for policies which reduce inequality. The literature on the demand for redistribution will be discussed in the following section.

The salience of a particular identity may shift category norms of primitive preferences,

such as those for risk, time or trust. For example, if the individual believes they may gain from reciprocation for the transaction because of a shared identity with other members of the group, the identity effect cannot be distinguished from a trust effect. Empirical evidence shows that identities can shift primitive preferences. Priming racial identities have been shown to shift time and risk preferences to conform with popular stereotypes (Benjamin et al. 2010). In lab studies using trust games, higher social status individuals were found to be more trusting of others, but no more trustworthy than lower social status individuals (Trautmann et al. 2013). In a trust game conducted in a large national survey in Germany, individuals of higher social classes were found to be more trusting than individuals from lower social classes (Korndörfer et al. 2015).

The experimental method used in this paper is designed to explicitly test whether inherited inequality is different to randomly assigned inequality in a laboratory setting. How individuals perceive inheritance is likely to have important implications for behaviour. It is not clear that inherited inequality would be considered more fair, less fair or similarly fair when compared to a random assignment. Although significant elements of inherited advantage are the result of luck, self-serving biases may reduce the propensity for individuals to consider this to be the case. Moreover, the importance of framing for belief and attitude formation imply that an inheritance framing may trigger different contribution motivations to other frames. Understanding how social preferences and behaviour interact with inheritance can contribute to understanding how to address inequality and structure societies that are able to promote increased welfare.

4 Experimental design

In this experiment, participants completed a public goods game under either an inheritance or lottery frame in equal or unequal groups. Contribution behaviour was analysed to ex-

amine the effect of the different group arrangements and intergenerational institutions on cooperation.

The experiment consisted of three stages, a recruitment survey, a public goods game and a post-game survey. In the recruitment survey participants had their perceived inheritance status elicited. The perceived inheritance status was elicited using an adapted version of the Cantril scale (Cantril et al. 1965). Instead of asking about life position, the question in this survey asked “Please imagine a ten-step ladder where the poorest people in South Africa stand on the bottom step (the first step) and the richest people in South Africa stand on the highest step (the tenth step). On which step did your grandparents stand over the course of their lifetime?” Questions in this formulation have been shown to be useful estimators of happiness and perceived social position (Deaton 2008). The question was included among a variety of other attitudinal indicators and demographic questions to be used as controls in regression analysis.

After completing the recruitment questionnaire, participants were randomly assigned to treatment cells and invited to attend an in-person session. Participants were randomly allocated to either a lottery treatment arm or an inheritance treatment arm. Within each treatment cell, participants are either allocated to a group where all group members have the same number of tokens (equality), or to a group where two members receive a high endowment of 700 tokens and two individuals receive a low token endowment of 350 tokens (inequality). Within the equal token endowment groups, in some groups, each member receives a token endowment of 700 tokens (High but equal) whilst in other groups, each members receives an endowment of 350 tokens (Low but equal). Table 1 summarises the treatment structure

To be clear, in the random allocation treatment in groups marked by inequality, token endowments are randomly allocated, with high endowment players receiving 700 tokens, and low endowment players receiving 350 tokens. In groups marked by equality, in some groups,

	Inheritance treatments			Lottery treatments		
	Equal		Unequal	Equal		Unequal
Group composition	LLL	HHH	LLH	LLL	HHH	LLH
Endowment	350	700	350, 700	350	700	350, 700
Pot size	1400	2800	2100	1400	2800	2100

Table 1: Treatment structure

each members receives 700 tokens (High but equal), whilst in others, each group members receives 350 tokens (Low but equal). Meanwhile, in the inherited allocation treatment, in groups marked by inequality, those who ranked their grandparents as being in the upper part of the income distribution (i.e. above the sample median) received a high endowment of 700 tokens, whilst those who ranked their grandparents as being in the lower part of the income distribution (below the sample median) received a low endowment of 350 tokens. The allocation of inheritors to equal or unequal groups was random. In the high but equal endowment groups, each group member received 700 tokens, and this was based on the fact that those group members had each ranked their grandparents as falling in the upper end of the distribution. Similarly, in the low but equal endowment groups, each group member received 350 tokens, and this was based on the fact that those group members had each ranked their grandparents as falling in the lower end of the distribution. A summary of the number of individuals allocated to each cell is presented in table 2.

Treatment	Freq.	Percent	Cum.
1. High Inheritance	56	12.50	12.50
2. High Random	52	11.61	24.11
3. Low Inheritance	52	11.61	35.71
4. Low Random	52	11.61	47.32
5. Inherit Unequal	131	29.24	76.56
6. Lottery Unequal	105	23.44	100.00
Total	448	100.00	

Table 2: Numbers allocated to the difference treatments

Participants completed a linear public goods game in groups of four administered on

z-tree computer software (Fischbacher 1999). Additional instructions were communicated using a standardised script. Individuals were informed of how their endowment amount was determined. Participants in the inheritance treatment received either a high or low endowment depending on whether they ranked their grandparent’s position as above the fifth step or not.⁹ Participants in the lottery treatment were allocated their endowments randomly.¹⁰ Participants were informed of the process which determined their endowments at the start of the experimental session. In each session all individuals participating in the same session had the same endowment determining process and were aware of this fact. In all sessions participants were unaware of the identity of the other members in their group. Half of the sample were allocated to play the public good game in equal groups and the other half were allocated to play the public good game in unequal groups. All participants were informed that it was possible that they would be placed in groups with individuals with different endowment amounts to their own. Participants were informed privately on their computer screen of the actual distribution of endowments of the other members of their group. The public good game comprised of eight rounds. Payoffs to the public good were defined by equation 1.

$$\Pi_i = (y_i - x_i) + \sum_{i=1}^N x_i \frac{k}{N} \quad (1)$$

Individual i splits their endowment y_i between the public and private accounts. The public

⁹Recipients of inheritance endowments had the following explanation read to them, “If your grandparents were placed below the average on the 10-step ladder, you will receive 350 tokens. If your grandparents were placed above the average on the 10-step ladder, you will receive 700 tokens. In other words, if you reported your grandparents to have been relatively lower in the income distribution relative to others participating in these decision tasks, you will receive the lower endowment of 350 tokens. If you reported your grandparents to have been relatively higher in the income distribution relative to others participating in these decision tasks, you will receive the lower endowment of 700 tokens.”

¹⁰Recipients of lottery endowments had the following explanation read to them, “In this exercise, you have each been randomly allocated to receive either a high or a low amount of money. This means that not all of you will receive the same amount of money. Out of everyone participating in the research, roughly half of you will receive a high starting amount and roughly half will receive a low starting amount. High allocations will be 700 tokens. Low allocations will be 350 tokens. In other words, if you were randomly allocated a low starting amount, you will begin the task with 350 tokens. If you were randomly allocated a high starting amount you will begin the task with 700 tokens.”

account is the sum of all the contributions (x_i) from the N group members. The public account is split among all group members equally ($N = 4$). The multiplicative scalar k is 2, implying a marginal return to capital of 0,5. Each round a player earns a payoff Π_i . The final earnings for the public good game are the sum of each of the separate round earnings. In each round of game, participants are informed of their contribution amount, the group total amount contributed to the public pool, the payoff for each individual group member from the public pool and the individual round earnings. Players were not informed which of the members of their group contributed which amount to the public good. Participants played the game using tokens as a currency. Tokens were converted to South African rands at the end of the session at a rate of 280 tokens=3 ZAR.

After the first eight rounds public goods game those in unequal groups completed a second public goods game of eight rounds. This occurred after a redistribution intervention. The details of that experiment are discussed in a later section. After all games were completed, additional attitudinal information was collected in a questionnaire on their computers. Data was collected on participants' exposure to experimental economics and their perceptions of the group they completed the experiment with. Controlling for these factors enables analysis which isolates the treatment effect magnitude relative to other factors which are known to affect public good contribution.

4.1 Experiment implementation

For this study, 448 students from the University of Cape Town were recruited to participate in a public good game. Participants were recruited from a university-wide email database with an advertisement which invited students to complete a decision-making task for which they would be compensated. The recruitment email is included in the appendix. The recruitment message made no mention of potentially loaded terms such as “economics” or “experiment.”

The recruitment message also informed prospective participants that they could earn up to 250 South African rand for an hour and a half of their time.¹¹.

All in person sessions were completed between August and October 2018 on the University of Cape Town Upper Campus. All participants were university students. Participants received a show up fee of 25 ZAR. On arrival at session participants were randomly allocated a computer on which they completed the experiment and questionnaires. All participants were divided by partitions to ensure that individual's decisions were private. Each participant was given a consent form which they signed if they wished to complete the task. In each session participants had the mechanics of a public goods game explained to them and a number of examples discussed to ensure they understood how the game worked.

Participants earned an average of 111 ZAR and the average session took an hour to complete. Once a session was completed, total earnings were calculated, adding together all games earnings and the show up free. All amounts earned were rounded up to the nearest rand. Participants were given invoices which they could exchange for payment at the campus bursar's office.

4.2 A note on the estimation methods used in this dissertation

In the following sections, individual contribution behaviour is compared for the different treatment conditions individuals experienced. Unconditional average effects will be estimated and reported for each round and over all eight rounds. Conditional regression estimates will be used to partial out the effects of covariates. The estimation methods used to calculate each of these sets of effects will be discussed in this section. While the methods used are carefully selected, their limitations should be considered when interpreting the results reported in the following sections.

¹¹Hourly student tutoring pay rate is approximately 100 ZAR

4.2.1 Graphical representations of average contributions

To represent how contributions evolved over the rounds of play, the average contribution for each round was plotted. These plots are all presented on graphs with identical scale. The range is limited to 0,6 to 0,2. The decision to limit the range was to enable easier perception of the trends discussed in the sections to come. It is important to note that the range of possible fraction contributions is 0 to 1 and thus that the average contribution trend is relatively muted when set against the full possible range of contributions.

4.2.2 Comparison of averages by treatment cell

To investigate differences in contributions by treatment, fraction contributions made by each individual were averaged over the eight rounds of play in a game. Then, the mean of all individuals' average contribution was calculated.¹² Comparisons of the average contribution are made using t-tests. Thus, the sample from which the average by treatment is calculated is a sample of means. This has an important implication, namely, that the distribution of the sample data is a sample of means. Thus by central limit theorem, the averages being calculated ought to be from data that is normally distributed.

T-tests are also used to compare density of certain traits by treatment. It is important to note that these averages are calculated from data that is binary and therefore cannot be normally distributed. The violation of this assumption introduces the risk of inflated significance when t-tests are performed. However, simulations have shown that t-tests perform well in large samples, once central limit theorem applies, suggesting that t-tests offer an acceptable approximation for this data (N=448). In fact, t-tests have been shown to perform well in samples of under 100 with non-normal data and under 500 with “extremely” non-normal data (Lumley et al. 2002). It is beyond the scope of this paper to run simulations to confirm

¹²The average for each individual is only included once in the calculation.

the performance of t-tests for this sample.

It is important to note that these calculations make no attempt to correct for clustering at the group level when calculating averages. This can bias upwards the level of significance indicated by the test. This issue addressed in the regression estimates.

4.2.3 Regression estimates

Ordinary Least Squares (OLS) regressions are used to estimate the effects of the treatments conditional on covariates. In the regressions, the period of play is controlled for and group level fixed effects are used. Standard errors are clustered at the individual level.

There are two limitations to this method. The first is that two-way clustering methods were not used. Thus, clustering at the group level in fraction contributions over time have not been accounted for. This issue may contribute to artificially small standard errors and consequently, overstating the significance of estimates. The second issue is that many regressions use fraction contributed as the dependent variable. By construction, fraction contributed is bounded at 0 and 1, however, OLS estimates are not constructed to remain bounded between 0 and 1. This issue can result in estimated effects that do not have a clear statistical interpretation. This issue is exacerbated by censoring at 0 and 1. Together, these two issues will result in linear estimates that are biased upwards. As such, the estimates discussed in this dissertation should only be considered upper bound estimates. The decision to use the OLS estimator despite these limitations is motivated by an awareness of the more demanding assumptions required for alternate estimators. In particular, the assumption of normality is not incidental in censoring models. As discussed earlier, this assumption is likely not met with the data used in this research. Consequently, the use of a simpler estimator with a straightforward interpretation offers advantages, even in the presence of some bias.

5 Experiment One: The relationship between inherited endowments and public goods contributions

In the first stage of the experimental session there were two different endowment determining mechanisms. An individual's endowment will be either high (700 tokens) or low (350 tokens) and these endowments were either inherited or randomly allocated. Moreover, individuals were placed in groups with either equal or unequal endowment distributions. In equal groups, all group members had the same number of tokens. In unequal groups there were two high endowment recipients and two low endowment recipients. Thus, three factors have been varied in stage one of this study, endowment amount, group distribution of endowments and endowment allocation mechanism. Each of these factors is hypothesised to influence individuals' behaviour. Behaviour is measured by the extent of contribution to the public pool. Greater tendencies to contribute are indicative of individuals being willing to cooperate or attempting to cooperate in the provision of public goods. The three factors varied experimentally tested for any interaction effects with one another. Thus, tests are performed to establish whether the treatment features cause different reactions to the intervention depending on the setting determined by the other two treatment conditions.

5.1 Treatment allocation

This experiment is designed to test whether endowment inequality determined by different processes affects individual contributions to the public good. Specifically, the experiment tests how the inheritance determined endowment affects behaviour relative to a randomly determined endowment. Moreover, the experiment tests whether the inheritance frame affects behaviour differently in different contexts. The two contexts examined are individual material status and group endowment distribution. Commentary on the contribution behaviour in

unequal groups is enabled by comparison to the behaviour in groups with endowment equality for all treatment conditions. Individuals were randomly assigned to equal or unequal groups. To confirm that random assignment has been successful, summary statistics for the sample of participants are reported split into unequal and unequal cells for both inheritance and lottery recipients as well as for the full sample in table 3. T-tests are conducted to confirm there are not significant differences in the average characteristics of the treatment cells. Significant differences are indicated with a star on both of the pair of estimates where the significant difference was found.

The summary statistics do not present tests of the allocation to high or low endowment status because roughly half of those allocated to receive high or low endowments were selected on the basis of their inheritance status. Thus, those who received high endowments in the inheritance treatment are more likely to share traits associated with inter-generational advantage and conversely, those who received low endowments are more likely to share traits associated with inter-generational disadvantage. This will cause the average characteristics in columns one and two where the sample is split by high and low to be skewed towards the traits of those whose endowment was allocated by inheritance status.

In the South African context, real-world inequality is an issue inextricably linked to race and gender. Consequently, we may observe systematically different responses to inherited inequality along race or gender lines. This experiment was designed to account for differing responses by race and gender by stratifying allocation to treatment cells by race and gender. Allocation to treatment cells was done separately for high and low inheritance individuals. Each sub-sample was stratified by race and gender and randomly allocated to either treatment or control. Despite this process of random allocation, potential selection in the propensity to attend an experimental session motivated the collection of data which can be used to control for individual characteristics correlated with inheritance status. Data on age, university faculty, present actual and perceived financial status, nationality, race and

gender were collected to ensure these factors could be controlled for. These characteristics are included in table 3 to establish whether they vary suitably across treatment cells.

	Lottery		Inherit		Endowment distribution		Full Sample
	Equal	Unequal	Equal	Unequal	Equal	Unequal	
Race							
Black African	0.606 (0.491)	0.581 (0.496)	0.574 (0.497)	0.634 (0.484)	0.590 (0.493)	0.610 (0.489)	0.600 (0.490)
Coloured	0.125 (0.332)	0.162 (0.370)	0.157 (0.366)	0.107 (0.310)	0.142 (0.349)	0.131 (0.339)	0.136 (0.343)
Indian/Asian	0.144 (0.353)	0.143 (0.352)	0.120 (0.327)	0.0992 (0.300)	0.132 (0.339)	0.119 (0.324)	0.125 (0.331)
White	0.0962 (0.296)	0.0857 (0.281)	0.130 (0.337)	0.153 (0.361)	0.113 (0.318)	0.123 (0.329)	0.118 (0.323)
Mixed race	0 (0)	0.0190 (0.137)	0.00926 (0.0962)	0 (0)	0.00472 (0.0687)	0.00847 (0.0919)	0.00670 (0.0816)
Prefer not to say	0.0288 (0.168)	0.00952 (0.0976)	0.00926 (0.0962)	0.00763 (0.0874)	0.0189 (0.136)	0.00847 (0.0919)	0.0134 (0.115)
Female	0.538 (0.501)	0.533 (0.501)	0.583 (0.495)	0.634 (0.484)	0.561 (0.497)	0.589 (0.493)	0.576 (0.495)
Faculty							
Commerce	0.260 (0.441)	0.276 (0.449)	0.222 (0.418)	0.298 (0.459)	0.241 (0.428)	0.288 (0.454)	0.266 (0.442)
Engineering	0.250 (0.435)	0.171 (0.379)	0.157 (0.366)	0.206 (0.406)	0.203 (0.403)	0.191 (0.394)	0.196 (0.398)
Health Sciences	0.0769 (0.268)	0.143 (0.352)	0.102 (0.304)	0.0687 (0.254)	0.0896 (0.286)	0.102 (0.303)	0.0960 (0.295)
Humanities	0.298 (0.460)	0.257 (0.439)	0.370 (0.485)	0.298 (0.459)	0.335 (0.473)	0.280 (0.450)	0.306 (0.461)
Law	0 (0)	0.00952 (0.0976)	0.00926 (0.0962)	0.0153 (0.123)	0.00472 (0.0687)	0.0127 (0.112)	0.00893 (0.0942)
Sciences	0.115 (0.321)	0.143 (0.352)	0.139 (0.347)	0.115 (0.320)	0.127 (0.334)	0.127 (0.334)	0.127 (0.334)
Language							
Afrikaans	0.0577 (0.234)	0.00952 (0.0976)	0.0370 (0.190)	0.0229 (0.150)	0.0472 (0.213)	0.0169 (0.129)	0.0313 (0.174)
English	0.327 (0.471)	0.448 (0.500)	0.426 (0.497)	0.435 (0.498)	0.377 (0.486)	0.441 (0.498)	0.411 (0.493)
Xhosa	0.115 (0.321)	0.190 (0.395)	0.167 (0.374)	0.145 (0.353)	0.142 (0.349)	0.165 (0.372)	0.154 (0.361)
Zulu	0.173 (0.380)	0.105 (0.308)	0.130 (0.337)	0.0763 (0.267)	0.151 * (0.359)	0.0890 * (0.285)	0.118 (0.323)
Other	0.327 (0.471)	0.248 (0.434)	0.241 (0.430)	0.321 (0.469)	0.283 (0.452)	0.288 (0.454)	0.286 (0.452)
South African citizen	0.856 (0.353)	0.895 (0.308)	0.843 (0.366)	0.870 (0.337)	0.849 (0.359)	0.881 (0.324)	0.866 (0.341)
Years of university study	3.317 (1.483)	3.105 (1.525)	2.935 (1.461)	2.878 (1.519)	3.123 (1.481)	2.979 (1.523)	3.047 (1.503)
Age in years	21.76 (2.987)	21.24 (3.106)	21.18 (2.754)	21.06 (2.820)	21.46 (2.879)	21.14 (2.945)	21.29 (2.915)
Financial aid recipient	0.394 (0.491)	0.419 (0.496)	0.407 (0.494)	0.458 (0.500)	0.401 (0.491)	0.441 (0.498)	0.422 (0.494)
Observations	104	105	108	131	212	236	448

Table 3: Sample characteristics for equal groups sub-samples

The average prevalence of various characteristics for the sample show very few significant differences between equal and unequal treatment cells. This is evidence of a fairly successful random allocation. No significant differences in average characteristics are found in the comparison of lottery recipients to equal and unequal groups in columns one and two and no significant differences are found in the comparison of inheritance recipients in columns three and four. In the full sample comparison of individuals allocated to equal and unequal groups in columns five and six there is a significant difference between the proportion of Zulu speakers in the equal and unequal treatments. Language will be included as a control in regression

analysis to ensure that linguistic differences are not driving the observed behaviour.

In column seven the full sample can be used to compare the composition of the study to that of the University and the country. In terms of race, white individuals are under represented relative to university figures for 2017 (the most recent available at time of writing). Meanwhile, Indian individuals are slightly over represented. The sample is biased towards students in later years of study with the average number of years of study slightly over 3 and the average age above 21. The sample appears to be poorer than a representative sample of the university would be, with 40% of the sample receiving some form of financial aid.

5.2 Does the group distribution, size or determining mechanism of an individual's endowment affect contribution behaviour in a public goods game?

This section examine each of these treatment variations individually to examine whether variations in that endowment feature changes public good contribution behaviour. Three behaviour indicators used throughout the analysis of this experiment to measure the extent of cooperative behaviour. The first is the average fraction of endowment contributed to the public pool. The second is the probability of being a full cooperator, someone who contributes their entire endowment to the public pool. The third is the probability of being a free rider, someone who contributes none of their endowment to the public pool.

Table 4 reports the average behaviour indicators for the entire sample, divided by the three treatment characteristics - endowment quantity, group distribution of endowments and endowment determining factor. Each of these three factors has two possibilities. Each pair of rows in the table describes the average behaviour of the full sample partitioned by the treatment characteristic. The final row describes the average behaviour for the full sample.

T-tests of the differences in these traits were performed, comparing each pair treatment possibilities. Significant differences in the average behaviour measurement between the two rows are indicator by stars on the two estimated averages. The full details of the t-tests performed are included in table 22 in the appendix.

5.2.1 Recipients of high endowments are significantly more cooperative than recipients of low endowments on average

Rows one and two of table 4 compare the sample of high endowment recipients to the sample of low endowment recipients to establish whether cooperative behaviour varies systematically based on the size of a participant’s endowment. If being rich or poor matters for an individual’s public good contribution decision, this will change the level of public good provided in that community.

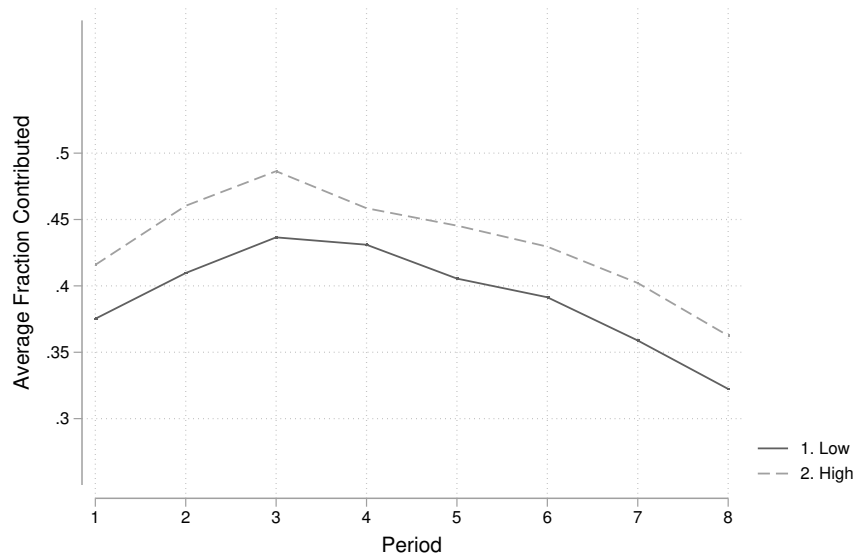


Figure 1: Average fraction contributed by endowment amount by period

High endowment recipients contribute a significantly larger fraction of their endowment to the public pool than recipients of low endowments. On average, recipients of low endowments contribute 39% of their endowment to the public pool, while recipients of high endowments

	Fraction	Full Cooperation	Free Riders
<hr/>			
Endowment amount			
Low	0.391*** (0.319)	0.0956 (0.294)	0.108** (0.310)
High	0.433*** (0.306)	0.0960 (0.295)	0.0768** (0.266)
<hr/>			
Group distribution			
Equal	0.402 (0.313)	0.0873 (0.282)	0.0985 (0.298)
Unequal	0.421 (0.313)	0.103 (0.304)	0.0866 (0.281)
<hr/>			
Allocation method			
Lottery	0.409 (0.322)	0.113** (0.316)	0.114*** (0.318)
Inherit	0.415 (0.305)	0.0808** (0.273)	0.0730*** (0.260)
<hr/>			
Total	0.412 (0.313)	0.0958 (0.294)	0.0922 (0.289)
<hr/>			
Observations	3612	3612	3612
<hr/>			

Table 4: Average behaviour by endowment feature

contribute 43% of their endowments. This effect of individuals contributing relatively larger fractions of relatively larger endowments will translate into even larger disparities in absolute contributions between high and low endowment recipients. Additionally, high endowment recipients are significantly less likely to be free riders than low endowment recipients. Nearly 11% of the observations of low endowment recipients are free riding, while around 7,7% of the observations of high endowment recipients exhibit free riding behaviour. This suggests that on average across all participants, those with a high endowments are more prone to cooperating in endeavours to provide public goods than those with a low endowments. Figure 1 plots the average contribution to the public pool over the eight rounds of the game for the high and low endowment sub-samples. The plots show the average decay in contributions over the eight rounds that is frequently found in public good games analysis. Average contributions remain well above the Nash strategy of contributing nothing to the public

pool. The difference in average fraction contributions is apparent from round one and is sustained over all eight rounds at a similar level. The dynamics for the two sub-samples follow a very similar trend in the rate of change over time. This suggests that the decay in contributions for individuals of the two endowment types occurs at a similar rate.

5.2.2 There is no significant difference in the average tendency for individuals in equal and unequal groups to behave cooperatively

Row three and row four of table 4 compare the average behaviour for the sub samples in equal and unequal groups. This comparison examines whether inequality causes any significant differences in average behaviour relative to equal groups. Differences in average behaviour for this comparison represent average responses to the distribution of wealth within the individual's community. For this analysis, unequal groups comprised of two high endowment individuals and two low endowment individuals are compared to all of the equal groups. Equal groups either comprise of only high endowment individuals or only low endowment individuals.

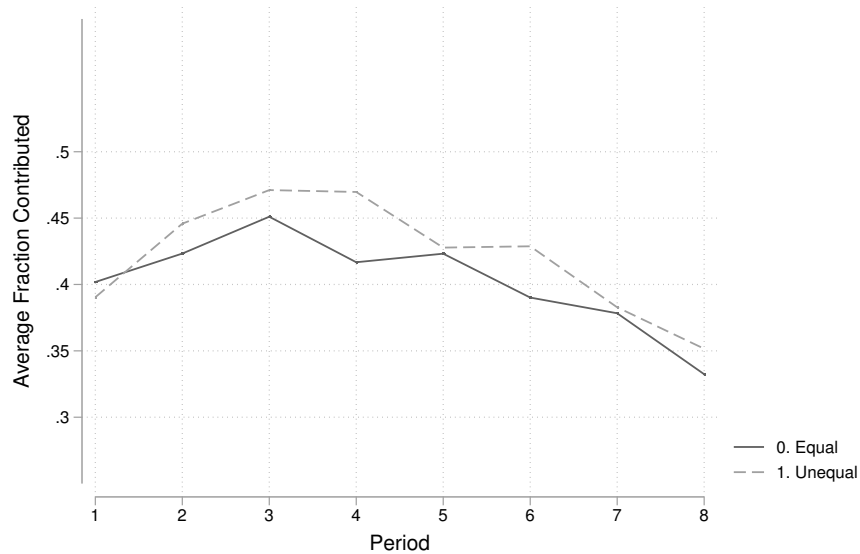


Figure 2: Average fraction contributed by endowment distribution by period

The estimates for the average fraction contributed by individuals in equal and unequal groups are quantitatively very similar. The average fraction contributed by individuals in equal groups is 40% and is 42% in unequal groups. In equal groups there is just under a 9% chance of an individual being a full cooperator and in unequal groups just over a 10% chance of an individual being a full cooperator. There is a 9,9% chance of an individual in an equal group being a free rider and a 8,7% chance of an individual in an unequal group being a free rider. There are no significant differences in any of the indicators of cooperation, suggesting that the average extent of co-operative behaviour is very similar in equal and unequal groups. Figure 2 plots the average fraction of endowment contributed over the eight rounds of the game, separated by the endowment distribution. The plot shows that the average fraction contributions are very close together throughout. There is just one percentage point difference in the average fraction contributed in round one and the lines plotting average fractions contributed by individuals in equal and unequal groups cross in period two. The average contribution behaviour of those in equal and unequal groups is consistently very similar.

This result may suggest that the level of inequality does not affect individual cooperation behaviour. However, it is not possible to comment on how this average individual behaviour will translate into public good provision because equal fraction contributions represent different absolute levels of contribution for rich and poor individuals. To establish the level of public good provision in unequal groups, it is necessary to examine whether high or low endowment individuals are driving the aggregate behaviour in unequal groups. Of course, it is also plausible that individuals in equal groups comprised only of those with high endowments behave differently to individuals in equal groups comprised only of those with low endowments and this effect is hidden in the averaging of the two. These possibilities will be examined in a later section.

5.2.3 Recipients of inheritance endowments are significantly less prone to free riding and full cooperation behaviour than lottery recipients are on average

Turning to the final treatment feature, rows five and six of table 4 present the average behaviour indicators for the two different endowment allocation mechanisms. In these rows, the average behaviour of those whose endowments are determined by their inheritance is compared to the average behaviour of those whose endowments are determined by a random process. Differences in the average behaviour for these two sub samples represent the effect of an individual being informed that their endowment (and that of the others in their group) corresponds to their real-world inheritance status rather than being told their endowment was randomly assigned. This comparison will examine whether receiving an inheritance triggers different behaviour than randomly being assigned an endowment.

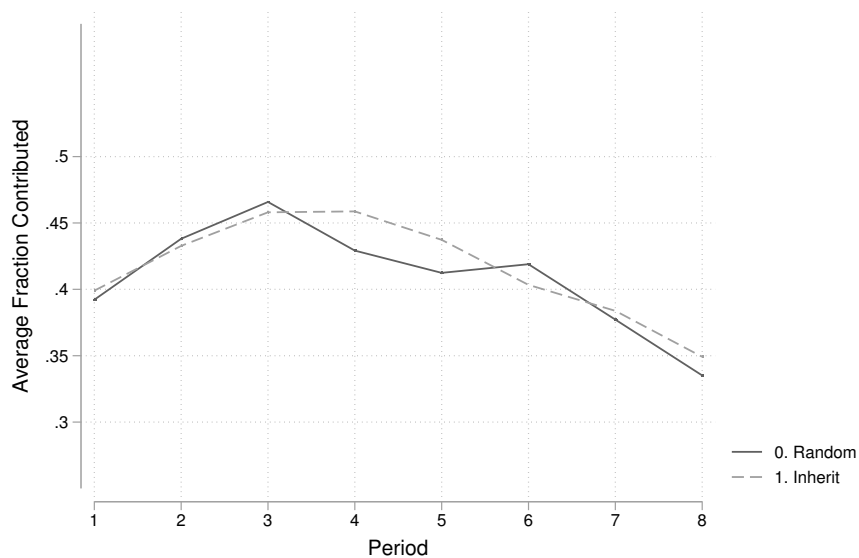


Figure 3: Average fraction contributed by endowment determining mechanism by period

The estimates in rows five and six of table 4 reveal that there is no significant difference in the average fraction contributed to the public good by inheritors and lottery recipients. While lottery recipients contribute just under 41% of their endowment to the public pool on

average, inheritors contribute 41,5% on average. The plot of average fraction contributions over the eight rounds in figure 3 shows the two sub-populations consistently exhibit very similar behaviour. The lines plotting average fraction contributions lie nearly on top of one another for the full interval.

Table 4 shows that inheritors are significantly less likely to be full cooperators relative to lottery recipients. The probability of a lottery recipient being a full cooperator is 11% and the probability of an inheritor being a full cooperator is 8%. However, inheritors are also significantly less likely to be free riders than lottery recipients. The probability of a lottery recipient being a free rider is 11% and the probability of an inheritor being a free rider is 7%. Together these results suggest a more heterogeneous reaction to the lottery endowments than to the inheritance endowments. The average probability of being a full cooperator or a free rider by endowment determining factor illustrate that inheritors are more muted in their contribution behaviour in a public good setting than lottery recipients.

In a group where initial positions are inherited rather than randomly assigned, people are on average less likely to make extreme contributions to public goods. It is not clear that this would affect the overall level of public good provided. Qualitatively, this may affect the experience individuals have of social cooperation in that society, although how this would play out is beyond the scope of this research. Similarly to group distribution, it is plausible that the experience and the corresponding response of inheriting an advantage is different to the experience of inheriting a disadvantage. This effect could not be established in the preceding discussion but will be examined in the sections which follow.

5.3 Regression estimates find endowment amount to have a significant negative effect and both inequality and receiving an inheritance to have no significant relationship with fraction contributions on average

Table 5 reports the estimated effects of the average fraction contributed to the public pool fitted with an OLS regression. Each regression includes controls for individual characteristics, period of the game, lagged total contributions from other group members and group level dummies.¹³ Thus, the estimates represent the conditional effect of each treatment factor. Each regression is estimated with robust standard errors, clustered at the individual level.

	1	2	3	4
High Endowment	-0.115*** (-6.33)			-0.115*** (-6.33)
Unequal Group		0.0224 (1.31)		0.0232 (1.41)
Inherited Endowment			-0.00868 (-0.49)	-0.0109 (-0.64)
Observations	3612	3612	3612	3612
R^2	0.418	0.392	0.391	0.420

Table 5: OLS estimates of average effect of the treatment dummies

Column one of table 5 estimates the effect of being a recipient of a high endowment relative to being a recipient of a low endowment. The regression offers evidence that endowment amount has a significant negative effect on the average fraction contributed to the public account. On average, receiving a high endowment is associated with an 11,5 percentage point reduction in fraction contributed. Column two presents the estimated effect of being in an unequal group relative to an equal group on average fraction of endowment contributed to

¹³Race, language, faculty, gender, age, year of study, a dummy for exposure to game theory, a dummy for South African citizen status, financial aid status, period of the game, the lagged ratio of group contribution from other group members to total possible pot size and group fixed effects are included as controls in all individual level regressions. The regressions without suppressed coefficients are included in the appendix.

the public pool. The regression offers no evidence of a significant relationship between group endowment distribution and average fraction contributed to the public pool. In column three being a recipient of an inheritance endowment rather than a lottery endowment is estimated to have no effect on average. In the fourth column all three factors that were varied experimentally are included in a regression. While endowment amount remains significant and is estimated to have a negative effect of the same size as when estimated alone, the coefficients on the dummy indicators for being in an unequal group rather than an equal group and being an inheritor rather than a lottery recipient remain insignificant.

These estimates suggest that inheritance status and group endowment distribution do not affect contribution behaviour on aggregate. The relationship between the three treatment features will be investigated in the following sections.

5.4 Does material status matter in unequal societies?

The previous section demonstrated that on average behaviour differs for those with high and low endowments. It is plausible that receiving a high or low endowment has a differing effect depending on the relative position in a group that the endowment amount implies. In this section the possibility that responses to endowment amount differ in equal and unequal societies is investigated.

5.4.1 Equal groups of individuals with high endowments and equal groups of individuals with low endowments both behave significantly differently to unequal groups, but in opposite directions

Figure 4 presents the average fraction of endowment contributed to the public pool separated by three group distributions of endowment - high equal, low equal and unequal groups. The

mean fraction contribution over each of the eight rounds are plotted in figure 4. These estimates can be used to examine whether the average across equal groups obscures differing responses in high and low equal groups.

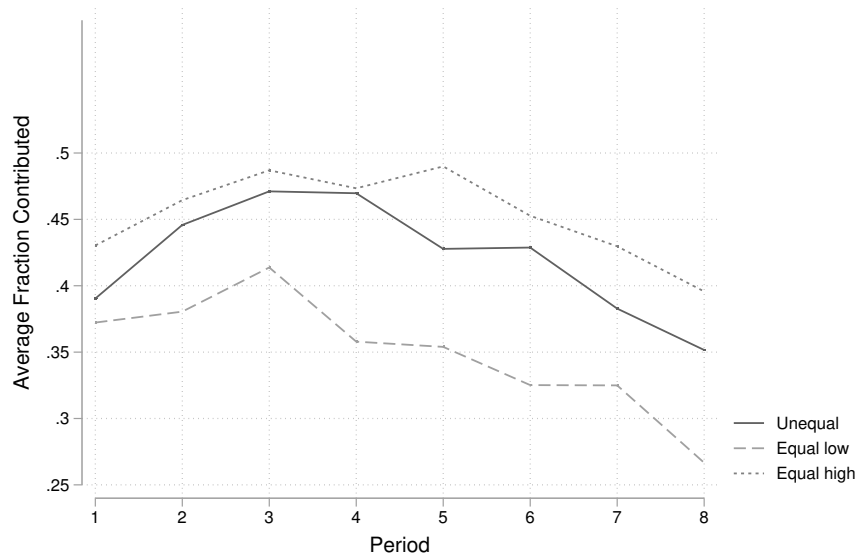


Figure 4: Average fraction of endowment contributed separated by whether the individuals were in high equal, low equal or unequal groups

Figure 4 demonstrates that individuals in equal groups with high endowments differ in their average contribution behaviour to individuals in equal groups with low endowments. The average fraction contributions in equal high groups are above the average fraction contributions in all other group types for all eight rounds. The average fraction contributions by individuals with low endowments in equal groups are lower than the average fraction contributions of individuals in all other group types. This illustrates that the very similar average fraction contributions calculated when comparing unequal and unequal groups overall does not actually represent homogeneous behaviour in public good interactions across the different group endowment distributions. The lack of significant difference in average behaviour between those in equal and unequal groups observed in the previous section is the result of counteracting significant differences in the behaviour of individuals in equal high and equal low groups to one another and to the behaviour of individuals in unequal groups.

Thus, equal groups of individuals with high endowments are able to create more public good than equal groups of individuals with low endowments. Individuals in equal groups with high endowments are able to create more public good than individuals in unequal groups and individuals in equal groups with low endowments are unable to create more public good than individuals in unequal groups.

Importantly, the differences in behaviour in high and low groups found here are consistent with the endowment effect established in the previous section. At present there is no evidence of behaviour differences resulting from the inequality context. It is plausible that the differing composition of unequal groups is what drives the differences in average fraction contribution. This can be more clearly examined with analysis of the individual behaviour of each endowment type. The following section will examine how high and low endowment individuals behave in different distributional contexts.

5.4.2 Low endowment individuals are significantly less cooperative when in groups comprised of only other low endowment individuals rather than mixed groups of high and low endowment individuals

The average behaviour of individuals is now examined to establish whether inequality causes different reactions among those with high and low endowments in equal and unequal groups. Table 6 presents the average indicators of behaviour for individuals with high and low endowments and for the sub-samples of high and low individuals in equal and unequal groups.

Rows one and two present the average behaviour indicators for those with low endowments in equal and unequal groups. This comparison will reveal whether inequality changes how low endowment individuals behave. If the distribution of endowments does not matter, low endowment individuals should contribute the same fraction of their endowment independent of who else is in their group. If the behaviour of low endowment individuals is responsive to

	Fraction	Full Cooperation	Free Riders
<hr/>			
Low Endowment			
Equal	0.349*** (0.304)	0.0757** (0.265)	0.133*** (0.340)
Unequal	0.428*** (0.326)	0.113** (0.317)	0.0857*** (0.280)
<hr/>			
High Endowment			
Equal	0.453* (0.313)	0.0984 (0.298)	0.0648 (0.246)
Unequal	0.414* (0.299)	0.0938 (0.292)	0.0876 (0.283)
<hr/>			

Table 6: Average behaviour indicators for high and low endowment recipients in equal and unequal groups

inequality in their groups, their contribution preferences are at least partially dependent on their material status relative to others.

Among individuals with low endowments, there are significant differences between those in equal and unequal groups for all behaviour indicators. In equal groups, low endowment individuals contribute a significantly smaller fraction of their endowment to the public pool than they do in unequal groups. While those with low endowments in equal groups contribute 34,9% of their endowment to the public pool, in unequal groups those with low endowments contribute 42,8% of their endowment to the public pool. In equal groups, low endowment individuals are significantly less likely to be full cooperators, 7,6% of low endowment recipients in equal groups being full cooperators as opposed to 11% of those in unequal groups. Low endowment recipients are significantly more likely to be free riders in equal groups than in unequal groups. While 13,3% of those in equal groups are free riders, 8,6% of those in unequal groups are free riders.

Figure 3 presents the plots of the average fraction contributed to the public pool by round. Panel 5a plots the estimated average fraction contributed by low endowment recipients in equal and unequal groups over all eight periods of the game. The graph shows that average

fraction contributions are very similar for low endowment individuals in equal and unequal groups in round one. Average fraction contributions diverge over the eight rounds of play, with the decay in cooperation occurring earlier and more steeply in equal groups than in unequal groups. By the eighth round of the game there is a significant difference in the average fraction contribution by group endowment distribution. Individuals in low endowment equal groups contribute just over a quarter of their endowment to the public pool on average in round eight, the lowest fraction contribution observed in this research.

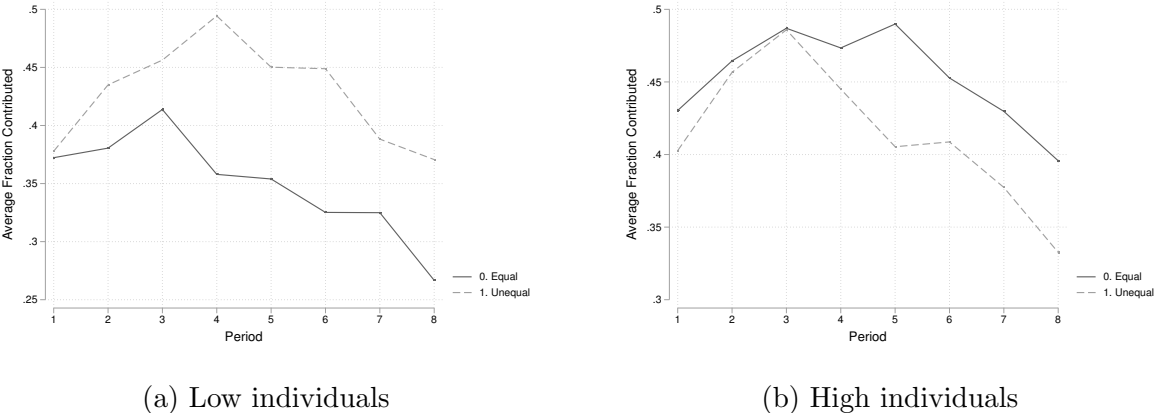


Figure 5: Plot of average fraction contributed by period for high and low individuals separated by group wealth distribution

It is striking that in unequal groups there is barely any decay in fraction contribution from the average recipient of a low endowment in round eight relative to round one (and the difference between rounds one and eight is statistically insignificant when a t-test is performed). These results suggest that individuals with low endowments struggle to sustain cooperation in equal groups, while they do much better at sustaining cooperation in unequal groups.

5.4.3 In contrast to low endowment players, high endowment players contribute significantly more in groups with endowment equality than in groups with endowment inequality

Rows three and four of table 6 report the average behaviour indicators for the high endowment sub-sample, split by group endowment distribution. This comparison will test whether the recipients of high endowments behave differently in equal as opposed to unequal groups.

High endowment individuals in equal groups contribute a significantly larger fraction of their endowments than high endowment individuals in unequal groups do. In equal groups high endowment recipients contribute 45% of their endowment to the public pool while in unequal groups high endowment recipients contribute 41% of their endowment to the public pool. There are no significant differences in the probability of a high individual being a full cooperator or free rider. In panel 5b of figure 23 the average fraction contribution by round for high endowment recipients is plotted separated by group endowment distribution. The plot shows that the average contributions begin fairly close together and diverge over subsequent rounds. High endowment individuals in unequal groups experience a decay in average contribution that begins earlier and is more rapid.

The evidence is fairly clear that high endowment individuals are more cooperative in equal groups than they are in unequal groups. Similar to with those of low endowments, there is a clear response to inequality among high endowment recipients. Conditional on receiving a high endowment, individuals in equal groups are more cooperative on average than individuals in unequal groups. This suggests that rich individuals are more prone to cooperating with one another than they are to cooperating in communities with income heterogeneity.

Overall the evidence shows that the presence of endowment inequality causes differences in the behaviour of high and low endowment recipients, but the differences occur in opposite

directions. This explains why the comparison of the average propensity to cooperate between the full sample of equal and unequal groups estimated no significant difference. When high endowment individuals are placed in unequal groups, they contribute smaller fraction contributions on average than when in groups with other high endowment individuals, while low endowment individuals placed in unequal groups contribute larger fractions on average than low endowment individuals in equal groups.

In unequal groups, low and high endowment recipients contribute very similar fractions of their endowment to the public pool on average. High endowment individuals contribute 41% of their endowment and low endowment individuals contribute 42,8% of their endowment¹⁴. Of course, this translates into different absolute contributions, with high endowment individuals contributing more to public pool in absolute terms. Overall this implies that the level of public good provision will be greatest in groups of only high endowment individuals, second greatest in groups with heterogeneous endowment distributions and least in groups of only low endowment individuals. This ranking of public good provision is consistent with individuals adjusting their contributions upwards when they are in communities with greater potential for public good provision. The differing fraction contributions in varied distributional settings are evidence of divergent interests for those with high and low endowments. High endowment recipients are unambiguously better off in equal groups with other high endowment individuals and low endowment recipients are better off in unequal groups with a combination of high and low endowment recipients.

5.4.4 Regression analysis confirms that high endowment recipients in equal groups are significantly more cooperative than all other types of individual

Table 7 presents the estimates of the interacting effect of endowment amount and group distribution of endowments. In column one the two dummies for endowment amount and

¹⁴A t-test fails to find any significant difference between these two estimates

group endowment distribution are included in the regression. Once again being in an unequal group is associated with a significantly lower fraction of endowment contributed to the public pool by nineteen percentage points. An interaction term which is set equal to one for all observations of individuals that were both inheritors and recipients of high endowments is included in the regression in column two. In this regression, the interaction term is significant, the endowment amount coefficient becomes significant and the coefficient on the dummy for unequal groups is no longer significant.

Dependent variable: Fraction contributed	1	2
High Endowment	-0.115*** (-6.33)	-0.240*** (-9.08)
Unequal Group	0.0228 (1.39)	-0.0827** (-3.23)
High*Unequal		0.210*** (6.11)
Observations	3612	3612
R^2	0.420	0.443

Table 7: OLS estimates of the interacting effect of endowment amount and group distribution of endowments

The coefficients on the regression in column two are consistent with the unconditional estimates presented in this section.¹⁵ Those with high endowments in unequal groups contribute 20 percentage points lower fractions of their endowments than those in high equal groups. Those in low unequal contribute less than a percentage point more than those in low equal groups on average. Those in high unequal groups are predicted to contribute very similar average fractions of their endowments to those in low equal and unequal groups, less than a percentage point more than those in low equal groups. Thus, those in equal groups with high endowments are found to be particularly good at cooperating relative to the other types of individual in this study while those in high unequal groups experience a significant and large negative effect as a result of being simultaneously recipients of high endowments

¹⁵Interaction terms are interpreted by calculating the estimated effect for each type of individual. For example, fraction contribution(High, Unequal)= $B_{High} + B_{Unequal} + B_{High*Unequal}$

and members of unequal groups.

5.5 Do reactions to inherited status vary for individuals with differing endowments in groups with varied endowment distributions?

The reaction to receiving an inheritance may vary for different kinds of individual. It is likely that the meaning of an inheritance differs for an individual who receives a relatively small or large amount. Equally, inheriting a small or large amount is likely to have different significance in equal or unequal groups. Thus, it is plausible that the inheritance determined endowment interacts with the different endowment amounts and with the distribution of endowments. Table 8 presents the average behaviour indicators for the high and low subsamples, separated by endowment determining factor and group endowment distribution.

	Fraction	Full Cooperation	Free Riders
<hr/>			
Low Endowment			
Low Inherit	0.375* (0.296)	0.0647*** (0.246)	0.0742*** (0.262)
Low Lottery	0.410* (0.341)	0.130*** (0.337)	0.145*** (0.353)
<hr/>			
High Endowment			
High Inherit	0.454** (0.309)	0.0963 (0.295)	0.0717 (0.258)
High Lottery	0.407** (0.302)	0.0956 (0.294)	0.0826 (0.276)
<hr/>			

Table 8: Average cohesion among unequal groups comparing those whose endowments were allocated randomly to those whose endowments were determined by inheritance status

5.5.1 Cooperation increases significantly with endowment level among those who inherit their status, but has no significant average relationship with endowment level for lottery recipients

In the same way that one might react differently to inequality depending on one's position in the income distribution, it is plausible that one would react differently to an inherited advantage rather than an inherited disadvantage. This possibility is examined in this section using comparisons of the average behaviour of inheritors and lottery recipients. Significant differences between the behaviour of low endowment lottery and low endowment inheritance recipients will reflect that low endowment participants respond differently to the inheritance frame than to a lottery process. Similarly, with endowment level held constant for high individuals, differences in behaviour would be evidence that the inheritance-determined endowment triggers different behaviour to the lottery-determined endowment. T-tests for significant differences in the indicators by endowment determining factor are presented in table 24 in the appendix. Significant differences between the pairs being compared are indicated with a star on both of the two estimates. Rows one and two in table 8 report the average indicators of behaviour for low endowment individuals, separated by endowment determining factor. This comparison will establish whether conditional on receiving a low endowment, an individual reacts differently to receiving that endowment by an inheritance process or by a lottery process.

The differences in behaviour are significant across all indicators. Low lottery recipients contribute 41% of their endowment to the public pool on average while inheritors contribute around 37,5% on average. Low inheritors are significantly less likely to be both full cooperators and free riders. While 6,5% of low inheritor observations are full cooperators, 13% of low lottery observations are full cooperators. These results show that low inheritance recipients are ultimately less cooperative than low lottery recipients. However, inheritance recipients are also less likely to be free riders, with 7,4% of low inheritor observations being

free riders and 14,5% of low lottery recipients being free riders. Paired with the fact that low inheritors had a significantly lower prevalence of full cooperation, this is evidence that low inheritors are much less prone to extreme contribution behaviour than low lottery recipients. This seems to suggest that low lottery endowment allocations trigger more heterogeneous reactions than low inheritance allocations. This may be evidence that low inheritance recipients are more disengaged and therefore do not experiment or attempt to employ ambitious strategies.

Figure 6 panel 6a plots the average fraction contributed to the public pool for low endowment recipients, separated by endowment allocation mechanism for the eight rounds of the game. The plot reveals that the average fraction contribution from those with random endowments is almost always above the average fraction contribution from those with inherited endowments. This trend begins in round one and is sustained over all but the fifth round of the game. While both sub-populations experience a decay in contributions as the final round nears, the higher early round contributions from those with randomly determined low endowments cause the average fraction contribution to remain higher.

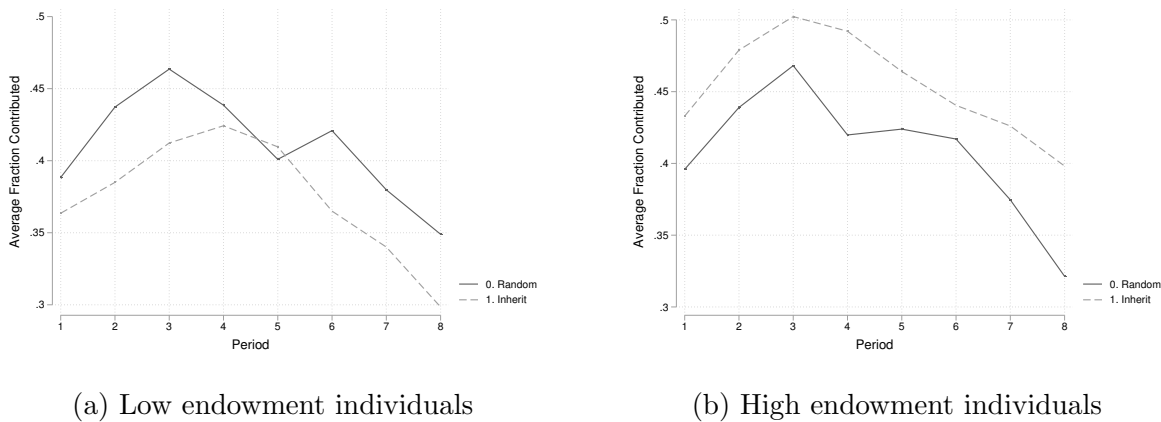


Figure 6: Plot of average fraction contributed by period for high and low endowment recipients separated by group endowment distribution

Rows three and four present in table 8 the estimated average behaviours for high endowment individuals separated by endowment determining factor. This comparison will

test whether conditional on receiving a high endowment, receiving an inherited endowment rather than a lottery endowment causes a change in contribution behaviour. Differences would demonstrate that individuals consider the inherited endowment differently to the lottery endowment. The comparison of the average fraction contributed to the public pool in table 8 reveals significant differences between high inheritors and high lottery recipients. On average, high lottery recipients contribute a lower fraction of their endowment to the public pool than high inheritors do. Figure 6 panel 6b plots the average fraction high endowment individuals contribute to the public pool each round, separated by endowment determining factor. The graph illustrates that the difference in average fraction contribution between the two groups originates in round one and is sustained over all eight rounds, getting generally larger from round four. Thus, high inheritors are consistently more cooperative than high lottery recipients. High endowment inheritors are more able to sustain cooperative behaviour than those who inherited low endowments.

For recipients of both high and low endowments, receiving that endowment as the result of an inheritance process instead of a random process causes a change in the tendency to exhibit cooperative behaviour. Recipients of low inheritance endowments contribute lower fractions of their endowments on average relative to those who received lottery determined endowments. Recipients of high inheritance endowments contribute significantly higher average fraction contributions relative to those who were randomly selected to receive high endowments. This suggests that the reaction to inheriting material status depends on the material status that is transmitted. Once again this demonstrates that the interests of those with high and low endowments differ. Those who inherit a low status become less cooperative, implying worse public good provision in their groups. This suggests those with low status will prefer to prevent the intergenerational transmission of material status. On the other hand, those who inherit high status become more cooperative. It is likely these individuals will prefer a world where material status can be inherited.

5.5.2 Regression estimates confirm that cooperation is increasing with endowment amount among inheritors

Table 9 presents the OLS estimates for the effect of the interaction of endowment amount and endowment determining mechanism. In column one the dummies for high endowment and inherited endowment are included and are found to be insignificant and very small quantitatively. In column two, an interaction term set equal to one when an individual is both the recipient of a high endowment and an inherited endowment. The interaction term is found to have a significant effect on fraction of endowment contributed to the public pool on average.

Dependent variable: Fraction contributed	1	2
High Endowment	0.00658 (0.44)	-0.0406 (-1.85)
Inherited Endowment	-0.000481 (-0.01)	-0.0654 (-1.46)
High*Inherit		0.0908** (3.13)
Observations	3160	3160
R^2	0.287	0.290

Table 9: OLS estimates of the interacting effect of endowment determining mechanism and group distribution of endowments

Those with high inherited endowments are estimated to contribute over 5 percentage points more of their endowment to the public pool than those with high randomly assigned endowments on average. Those with low inherited endowments are estimated to contribute 6,5 percentage points less of their endowment to the public pool than those with low randomly assigned endowments. Thus, a significant positive effect on cooperation is shown to result from an individual simultaneously receiving an endowment that was high and was determined by an inheritance process. While inheritors are shown to become significantly more cooperative when endowments were increased, the effects for lottery recipients are shown to be relatively smaller and insignificant in the regression estimates. This is consistent with the

disengaged behaviour observed among low inheritors and the more cooperative behaviour observed among high inheritance recipients in the unconditional estimates.

5.6 Do individuals react differently to inherited advantage and disadvantage when communities are unequal?

In this section the inheritor sub sample and the lottery sub sample are analysed separately and the behaviour of high and low inheritor types is compared by group endowment distribution. This comparison will examine whether inheriting material status has different effects when the community has varied distributions of wealth. Intuitively, inequality may imply that inheriting a high or low material status matters more because it implies a relative advantage or disadvantage in addition to a greater or less absolute amount. As the previous section established that individuals respond differently to receiving high and low inheritance, the comparison of individuals in equal and unequal groups is separated by endowment level so that these effects can be observed. The discussion primarily focuses on the inheritance sub-samples because these are the treatment sub-samples, however the lottery sub-samples are included to illustrate the counter-factual. Notably, the lottery sub-sample behaviour differs from the behaviour of its corresponding inheritance sub-sample for each comparison.

Table 10 reports the average indicators of behaviour for four sub-samples, namely, low inheritors, high inheritors, low lottery recipients and high lottery recipients. The table is separated into segments which compare individuals with common endowment amount and endowment determining factor in equal and unequal groups. Thus, these comparisons should establish the conditional responses of various sub-samples to inequality. Tests for significant differences are performed in table 25 in the appendix, significant differences are indicated with stars in table 10.

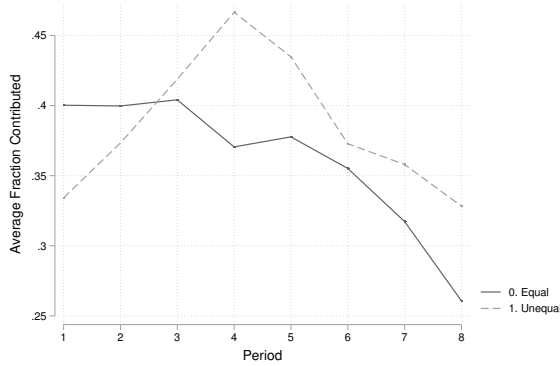
	Fraction	Full Cooperation	Free Riders
Low Inheritors			
Equal	0.361 (0.289)	0.0673 (0.251)	0.0889 (0.285)
Unequal	0.386 (0.302)	0.0626 (0.243)	0.0626 (0.243)
High Inheritors			
Equal	0.502*** (0.331)	0.127** (0.334)	0.0826 (0.276)
Unequal	0.414*** (0.282)	0.0701 ** (0.256)	0.0625 (0.242)
Low Lottery			
Equal	0.338*** (0.319)	0.0841*** (0.278)	0.178** (0.383)
Unequal	0.479*** (0.348)	0.174*** (0.380)	0.114** (0.318)
High Lottery			
Equal	0.400 (0.283)	0.0673** (0.251)	0.0457*** (0.209)
Unequal	0.415 (0.319)	0.123** (0.329)	0.118*** (0.323)

Table 10: Average cooperation indicators among unequal groups comparing those whose endowments were allocated randomly to those whose endowments were determined by inheritance status by high and low endowment status

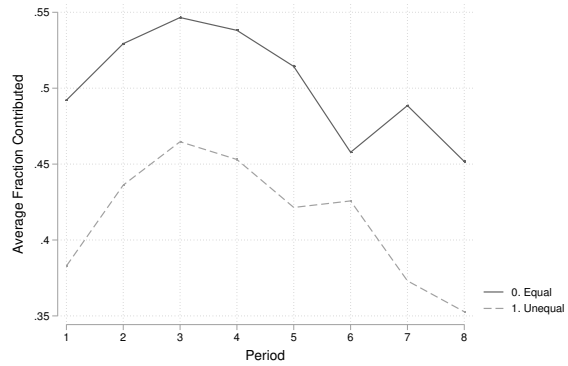
5.6.1 Low inheritors are indifferent to the distribution of endowments in their groups

In rows one and two of table 10 low inheritors in equal and unequal groups are compared. Low inheritors behave very similarly in equal and unequal groups. In equal groups the average fraction contributed to the public account of 36% and in unequal groups the average fraction contributed was 38,6%. The proportion of observations in both equal and unequal groups that were full cooperators was just over 6%. In equal groups the proportion of observations that were free riders was 9% while the proportion of observations that were free riders in unequal groups was 6,2%. The indicators of do not reveal any substantial differences for any behaviour indicator. Average fraction contributions by round for low inheritors are plotted in figure 7 panel 7a. While the average fraction contribution plot shows that the average round one fraction contribution by low types was lower in unequal groups than in equal groups, this difference is not statistically significant. Moreover, the gap between the two averages inverts in round four of the public goods game and closes subsequently. Overall the difference in the average of all eight rounds is not statistically significant. This suggests that among low recipients of inheritance endowments, the distribution of the group does not

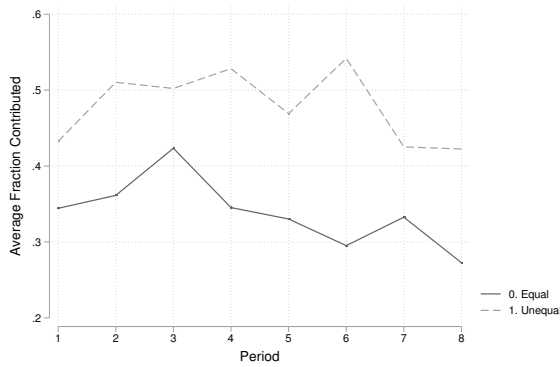
matter for contribution behaviour.



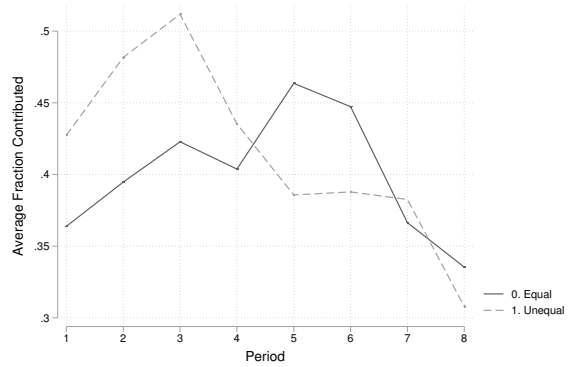
(a) Low inherit individuals



(b) High inherit individuals



(c) Low lottery individuals



(d) High lottery individuals

Figure 7: Distribution of the fraction of endowment contributions over the periods of the game, separating equal and unequal individuals in various sub-samples

It is interesting that this pattern is not the same as the behaviour pattern observed when low lottery recipients are compared in equal and unequal groups. In the estimates of average behaviour for individuals with lottery allocated low endowments in rows five and six of table 10, individuals in unequal groups exhibit significantly more cooperative behaviour on all metrics than they do in equal groups. In equal groups lottery recipients contribute 33,8% of their endowments while in unequal groups they contribute 47,9% of their endowments. In equal groups of low lottery recipients 8,4% of observations exhibit full cooperator behavior while 17,4% of those in unequal groups exhibit full cooperator behaviour. Among low lottery recipients in equal groups 17,8% of observations are free riders while in unequal groups 11,4% of observations are free riders. This demonstrates that it is the inheritance framing that

causes participants to be indifferent to context because the distribution of endowments does matter for recipients of lottery-determined endowments.

Extreme contribution behaviour is not statistically different for low inheritors in equal as opposed to unequal groups. The similar behaviour of low inheritors in equal and unequal groups is striking because lottery recipients of low inheritance endowments are shown to be very responsive to the endowment distribution of their group, with a very high prevalence of free riding in equal groups and a high prevalence of full cooperator contributions in unequal groups. It appears that low lottery recipients devise strategies to earn despite their low endowment status while low inheritance recipients appear resigned to earning low amounts.

5.6.2 High inheritors are more cooperative in equal groups than in unequal groups

Rows three and four of table 10 present the average indicators of cooperative behaviour for high inheritance recipients in equal and unequal groups. High inheritors in equal groups are found to contribute significantly larger fractions of their endowment to the public pool on average than high inheritors in unequal groups. In equal groups the average fraction contributed by high endowment recipients is 50%. In unequal groups it is 41,4%. This is one of the most striking differences in behaviour found in this experiment. In equal groups recipients of high inheritance endowments fully cooperate in 12,7% of observations and in unequal groups they fully cooperate in 7% of observations. Figure 7 panel 7b plots the average fraction contribution for high inheritors in equal and unequal groups. The plots of average contribution reveal that the difference between individuals in equal and unequal is apparent from round one, suggesting that the different responses originate prior to any interaction in groups. The gap in the fraction contributed is sustained over all eight rounds and is similar in size in round one and round eight. High inheritors in equal groups are significantly more likely to be full cooperators than high inheritors in unequal groups.

Moreover, there is a higher frequency of full cooperators among high equal inherit types than among high unequal inherit types. This is consistent with the result that high equal inherit types make higher fraction contributions on average. As there is not a significant difference in the prevalence of free riders across the two groups, the difference in average is clearly driven by more generous behaviour at the top of the distribution of high inheritors in equal groups. Overall, cooperation is significantly lower in unequal groups than in equal groups for those who inherited high endowments.

High inheritors contribute substantially more in equal groups than their counterparts in unequal groups. However, the same trend is not observed in the estimates for average behaviour among individuals with randomly assigned high endowments in rows seven and eight of table 10. Among individuals with high randomly assigned endowments there is no difference in the average fraction contributed to the public pool by group distribution of endowments. Moreover the prevalence of full cooperator and free rider observations is significantly greater in unequal groups than in equal groups for high lottery recipients.

The reactions of high inheritors to inequality are less cooperative than their reactions to equality. In comparison, high lottery recipients are not markedly more cooperative in unequal as opposed to equal groups. This suggests that the increased cooperative behaviour in high equal groups of inheritors is not driven exclusively by the increased potential for public good provision that is the result of being allocated to a group with only others with high endowments, since this potential is present for both inheritors and lottery recipients. Instead, the inheritance framing is only difference between the two comparisons. Thus the difference response to inequality observed for high inheritors and high lottery recipients illustrates the effect the inheritance frame had on contribution behaviour. This implies that groups of high endowment inheritors are better able to achieve cooperation in the provision of public goods than groups of randomly determined high endowment recipients.

Among inheritors, there is a marked difference in the average behaviour of high types de-

pending on whether they were placed in an equal or unequal group. This implies that high inheritors' willingness to contribute to public goods is affected by the endowment distribution of the groups in which the public good is being provided. It is striking that there is no difference for low inheritors' behaviour based on the endowment distribution of their groups. Low endowment inheritors are not sensitive to their group distribution and low lottery recipients are more cooperative in unequal groups than in equal groups. This suggests that the inheritance frame causes high endowment inheritance recipients to be more responsive to their group distribution, while causing low endowment inheritance recipients to become less responsive to (or more disengaged from) their group's endowment distribution. This implies that low endowment individuals should prefer heterogeneous communities in which material status is not inherited, while high endowment individuals should prefer homogeneous communities in which material status is inherited.

5.6.3 Regression analysis confirms that inherited inequality reduces cooperative behaviour and causes those with high and low endowments to have conflicting interests in group distribution and endowment allocation methods

The results of three regressions are presented in table 11. Each regression includes individual controls for race, language, gender, age, faculty, year of study, nationality, financial aid status, time period and an indicator of exposure to the experimental economics. Additional controls included for group characteristics are the sum of contributions to the public pot of other group members and a group-level dummy.

The first column regression reports the estimates for the interaction effect of simultaneously receiving an endowment that was inherited and being allocated to an unequal group. The regression includes controls for all three features that were varied experimentally. The coefficients for unequal groups and recipients of inheritance determined endowments are both significant and negative. Thus, those with lottery endowments in unequal groups and

Dependent variable: Fraction contributed	Full Sample	Low	High
Unequal Group	-0.290*** (-4.85)	-0.107* (-1.97)	-0.281** (-3.21)
Inherited Endowment	-0.291*** (-4.02)	0.0268 (0.57)	-0.325** (-3.15)
High Endowment	-0.00775 (-0.51)		
Inherit*Unequal	0.149* (2.04)	0.318*** (4.22)	0.0705 (0.71)
Observations	3160	1565	1595
R^2	0.293	0.347	0.325

Table 11: Regression estimates of treatment effects

those with inherited endowments in equal groups are both estimated to contribute nearly 30 percentage points less of their endowment to the public pool than those in with lottery endowments in equal groups. Meanwhile those in unequal groups with inherited endowments are estimated to contribute around 43% less of their endowment to the public pool than those in equal groups with lottery assigned endowments. This implies that both inequality and inheritance-determined endowments are associated with significant reductions in cooperation. The estimates for the full sample may conceal the counteracting effects for recipients of high and low endowments so the following two regressions in columns two and three report the estimates for the sub-samples of those with low endowments and those with high endowments respectively.

In the low sub-sample regression those who inherited their endowments and were placed in unequal groups contribute nearly 24 percentage points more of their endowment to the public pool than those with randomly assigned endowments in equal groups of only low endowment recipients. Those who received randomly assigned endowments and were placed in unequal groups are found to contribute ten percentage points less to the public good on average than those with randomly assigned endowments in equal groups. This result is the reverse of the unconditional estimates discussed earlier where low inheritors were indifferent to their group endowment distributional setting. This suggests that the difference observed

in the unconditional comparison is explained by the other treatment, group or individual characteristics. This regression result does illustrate that those with low endowments that were determined by inheritance are significantly more cooperative in unequal groups than in equal groups.

In the high endowment sub-sample, those with lottery-assigned endowments in unequal groups and those with inherited endowments in equal groups are both estimated to contribute significantly smaller fractions of their endowment to the public pool than those in equal groups with lottery assigned endowments. Those with inherited endowments in unequal groups are estimated to contribute 53,6 percentage points less of their endowment to the public pool than those in equal groups with randomly allocated high endowments. All individuals who inherited high endowments are less cooperative than individuals who received endowments randomly.

Thus, those with low inherited endowments are more cooperative in unequal groups while those with high inherited endowments are more cooperative in equal groups. This suggests that those with low endowments are better off in unequal groups than in equal groups of low endowment individuals while those with high endowments are better off equal groups with other high endowment individuals.

The negative effects of inequality are especially pronounced for those with low endowments. One potential solution to inequality is the redistribute from those with high endowments to those with low endowments such that the distance between individual's position on the distribution of endowments is smaller. This may be able to reduce the negative effects of having a low endowment and the negative effects of being in an unequal group. The effectiveness of redistribution policies for addressing the adverse effects of inequality and low endowment status are examined in the following section in a second experiment in which two redistribution policies were implemented in unequal groups after the eight rounds of play that have been analysed in this section.

6 Self-interest, perceptions of fairness and redistribution preferences

One way to address the issues associated with inequality may be to redistribute income or wealth to ensure a more equitable distribution. However, public good contributions ex-post may be affected by preferences for or against redistribution. Distributions of income that are caused by redistribution policy may be subject to opposition from those who perceive the policy to be unfair. As was seen in the preceding discussion, unfairness can trigger disengagement from some community members. Consequently, the perceived fairness of the redistribution intervention is likely to affect contributions to public goods ex-post.

Preferences for redistribution vary by economic status. While there is a general consensus that those of higher economic status are more likely to be opposed to redistribution policies, the evidence concerning low and middle income individuals is more mixed. The review by Clark and D'Ambrosio (2015) summarises attitudes towards levels of inequality as captured by the ratio of the desired Gini coefficient to the perceived actual Gini. The average preference in all countries in the study was for a lower level of inequality than the perceived present level. While the average individual in countries such as Japan and the US had a greater tolerance for the present level of perceived inequality, the average individual in countries such as Spain and Sweden had a far stronger preference for a reduction in inequality (Clark & D'Ambrosio, 2015). High social status, as measured by income, education and job status was found to be associated with reduced support for redistribution in a Dutch study (Trautmann et al. 2013). A study using European Social Survey data found that although the lowest earners are not sensitive to income inequality, when inequality was greater, the median earner had a higher demand for redistribution policies (Finseraas 2008). Meanwhile the study finds that wealthier individuals have a lower demand for redistribution (Finseraas, 2008). This suggests that the distribution of incomes in a society will shape social preferences

for policy and consequently, the voter behaviour in that society. In societies with differing proportions of wealthy or poor individuals, the voter influence and capacity to demand redistribution policies will differ. Franko et al. (2013) show that those of low economic status strongly supported redistribution. They argue that making the distributional implications of a transfer policy clear drives increased support for redistribution. By contrast, Bartels (2005) finds evidence that low income individuals support tax cuts. This is argued to be driven by an evaluation of how tax burdens affect their own quality of life.

A study by Fong (2001) provides evidence that the demand for redistribution is primarily driven by beliefs and attitudes rather than objective personal characteristics. The study uses Gallup polling data on United States respondents from 1998. The study finds that those who believe that economic status is a result of at least some degree of chance are significantly more likely to support redistribution. Similarly, those who believe that the United States is a country of “haves” and “have-nots” are significantly more likely to support redistribution. Conversely, those who believe that the United States has many opportunities are significantly less likely to support redistribution.

A study which asked individuals to report their perceived position on the income distribution found that more than 85 percent of respondents underestimated their position on the distribution (Karadja et al. 2017). When these individuals were informed of their true position on the distribution, those with politically right of centre views adjusted their support of redistribution downwards and were significantly more likely to support the conservative party. Meanwhile, individuals who believed that economic success was driven by luck or who believed that redistribution policies do not have a distorting effect on the economy did not change their political allegiance nor their support for redistribution. Thus, the information was shown to have an overall polarising effect on society. Those who were already on the right were pushed even further right, while those on the left did not move right at all.

The perceived fairness of the income generating process is found to have a moderating effect

on the demand for redistribution in Bjørnskov et al. (2013). Moreover, perceptions of high social mobility were found to increase the demand for redistribution. Kuziemko et al. (2014) suggest that last place aversion may contribute to the attitudes against redistribution.¹⁶ They find that people in second to last rank in a lab experiment do elect to not transfer money to those below them. Moreover they find strong opposition to increases in the minimum wage among those just above the minimum wage.

A survey experiment of the demand for redistribution found that information on inequality increases respondents concern about inequality (Pellicer et al. n.d.). However, this information did not promote changed preferences about taxation (the chosen measure for redistribution). By contrast, information that presented inequality reductions as feasible did promote a demand for higher tax rates among respondents. Conversely, exposing respondents to videos of poorly-perceived politicians discussing inequality caused the respondents to be more accepting of inequality and less likely to demand redistribution. In a similar vein, Biel & Thøgersen (2007) summarise studies which show that social contributions are lower when individuals are unaware of how their actions could help, or when they believe their actions to either be ineffectual or difficult to execute. In a survey experiment conducted in Germany, attitudes to inheritance tax were elicited. People were found to be more tolerant of bequests that were perceived to motivated by pro-social intentions (Wrede 2014).

To the best of my knowledge, there is one only other study that has investigated the effect of redistribution for public goods games played in the lab.¹⁷ Maurice et al. (2013) find that redistribution had no significant effect on public good provision on average. However, the redistribution did shift individual contribution behaviour. In groups where the redistribution resulted in equal groups, those whose endowments were high in stage one continued to under-contribute, while those whose endowments were low in stage one continued to over contribute.

¹⁶Last place aversion is a strong preference for being ranked above at least one other individual, or a weighting which particularly highly weights the negative associations with being the lowest ranked individual

¹⁷This study does not consider the effect that real-world status or in particular real-world inheritance status may have on individual's responses to the redistribution

Those who became richer adjusted their contribution share upwards and those who became poorer adjusted their contributions downwards. The adjustment downwards for those who became poorer was smaller than the upwards adjustment for those who became richer. The over contribution of the poor is a product of inequality, shown to be present in the unequal treatments which do not have a redistribution intervention. Nonetheless, it is striking that even redistribution which creates equality in the groups does not negate the tendency for those who previously had low endowments to over-contribute to the public good.

7 Stage Two Experiment: Examining the effect of redistribution for group cooperation

In the previous section of results it was established that those with high endowments, particularly in the inheritance treatment contribute less to the public pool on average when in unequal groups as opposed to equal groups. This suggests that it may be worth making groups more equal to induce higher levels of public good contribution from those who were previously rich while giving larger endowments to those who exhibited a tendency to contribute large fractions of their endowments to the public pool in stage one (those with low endowment in unequal groups). If participants are willing to increase their public good contributions after the redistribution, the level of public good provision that all group members enjoy will increase. This experiment will examine whether the more equal groups are able to sustain cooperative behaviour to ensure that redistribution policies create the intended material benefit.

In the previous section, equal groups of high endowment individuals were found to be more cooperative than equal groups of low endowment individuals. Unequal groups with two high and two low endowment individuals were somewhere in the middle of these two

group types. As such, it is not clear how more equal groups that fall somewhere in between these two extremes will behave after the redistribution. Additionally, different redistribution rules are tested to examine how participants adjust their contribution behaviour after the redistribution takes place. In theory, the degree of public good provision could be equivalent for any distribution of endowments so long as pot size remains the same. On the other hand, players may differ in their reactions depending on how much they are taxed or how much they gain. Although these two effects could cancel each other out at the group level, an asymmetry in how individuals weigh losses and gains may cause those who previously had high endowments to over-adjust. Once again, it is hypothesised that different context frames will cause different reactions to the redistribution policy.

7.1 Stage two experiment design

As was indicated in the initial experiment design section, this experiment consisted of two stages. After participants in the unequal groups had completed stage one public goods task of eight rounds, (the experiment discussed in the previous section) a redistribution rule framed as a “tax” was imposed by the experimenter. Participants were informed that the tax was designed to address the inequality in the distribution of endowments within groups. In these groups, participants who had received a high token endowment in the first stage of the game were taxed by having a set number of tokens subtracted from their endowment amount for the stage two experiment. Participants who had received a low token endowment in the first stage of the game were given an additional sum of tokens equal to the number taken from each high participant. Participants were informed that the amount taken from high endowment players was given to the low endowment players to ensure the redistribution was salient. The complete instructions delivered to participants during the experiment are included in the appendix. The extent of tax was varied. While creating full equality may be the ultimate goal for policymakers, in reality it is more realistic that a redistribution only

reduces inequality. Half of the groups had inequality reduced by the redistribution and the other half had inequality fully eliminated. The design of the treatments is summarised in table 12.

Stage one distribution	Inheritance treatments		Lottery treatments	
	Unequal		Unequal	
Stage two intervention	Minimise	Equalise	Minimise	Equalise
Tax amount	100	175	100	175
Endowments	450, 600	525	450, 600	525
Pot size	2100	2100	2100	2100

Table 12: Treatment structure for stage two of the experiment

Individuals in the second stage of the experiment vary on three metrics. They are subject to one of two redistribution rules. The tax either redistributed 100 tokens from each high player (a 14% reduction in endowment) to each low player (a 22% increase) or redistributed 175 tokens from each high player (a 25% reduction) to each low player (a 50% increase). In the first redistribution policy, inequality between those who received high endowments in the first eight rounds of play and those who received low endowments in the first eight rounds of play is reduced but not eliminated (“minimised”). High endowment players now start each round with 600 tokens and low endowment players start each round with 450 tokens. In the second redistribution policy, endowments are “equalised” and all players start each round of play with equal endowments of 525 tokens. Players have endowments that are either inherited or randomly assigned and groups comprise exclusively players with the same endowment allocation mechanism. Individual players will have had either high or low endowments in the first stage of the experiment.

All of these groups played a second eight round public goods game after they were informed of the redistribution policy. The second stage game had the same rate of return and remained in the same groups that they were matched into for the first stage. Participants were aware that groups comprised of the same members they played with in stage one. In these groups, a second public goods game is played in order to examine whether the two policies had any

effect on contributions to the public good ex-post. As all groups have the same total group endowment, all groups have the same theoretical potential to provide public goods. This enables commentary on the relative extent of public good provision in the different treatment cells. Thus, the following section will examine whether a redistribution policy is able to shift behaviour from the patterns observed in stage one this experiment and whether the different policies have differing effects for cooperative behaviour to one another.

7.2 Do the treatments affect the reaction to redistribution?

To evaluate whether the redistribution policies have different effects, cooperative behaviour in stage two must be compared across treatment cells and also be compared to the average behaviour observed in stage one of the experiment. First, the three group features that were varied experimentally in stage two are examined. This is to establish whether varying any of these three factors has an effect on average behaviour independent of the group context that the factor was interacting with. This comparison is done between treatments in stage two and for each of the relevant treatments over time.

7.3 Does the extent of redistribution affect matter for cooperative behaviour?

To test whether varying the extent of redistribution has an effect on the extent of public good provision, the sample is split based on which redistribution policy they were subject to. Comparisons of both individual level behaviour and group level public good are performed. All groups have the same pot size in stage two, so each group level of average contribution is directly comparable. Each redistribution policy may cause shifts in behaviour in the game which occurred after the redistribution took place. For this reason each treatment

has its stage two behaviour compared to the average behaviour prior to the redistribution intervention.

7.3.1 In stage two play individuals in the equalise intervention are more cooperative than those in the minimise intervention on average, but this does not translate into significant differences in public good provision

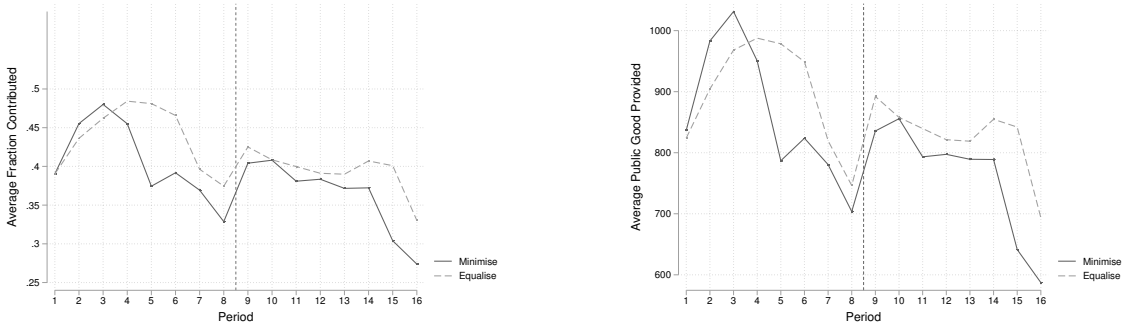
Table 13 presents the estimated indicators of cooperation for groups that were subject to the reduced inequality and eliminated inequality interventions in the second stage of the game. The first two columns present the estimates for just the stage two game which was played after the redistribution. The second two columns present the estimates for just the average indicators in eight rounds of stage one, prior to the redistribution. T-tests of differences in behaviour between those subject to the two redistribution rules were performed and significant differences are indicated with stars (*). Differences between the stage one value and stage two value of the same indicator are indicated with a dagger (†) and will be discussed in the sections which follow.

On average over the eight rounds of the stage two game those in the minimise treatment contribute 36% of their endowment to the public pool while those in the equalise treatment contribute 39% of their endowment to the public pool. T-tests of the difference in average fraction contributed between minimise and equalise are performed in table 26 and show that the difference is significant at the five percent level. There is no significant difference in the average total group public pool of contributions. This means that the differences in average fraction contribution at the individual level result in the same level of public good provision at the group level. It is worth noting that those in the minimise treatment still face a degree of group inequality and so the fact that the two groups are contributing different average fractions could represent the same average contribution in absolute terms at the group level. This is likely the case since there is no significant difference in the pot of contributions.

	Fraction Contribution	Public Good	Fraction Contribution S1	Public Good S1
<u>Redistribution Policy</u>				
Minimise	0.362*†† (0.312)	805.0†† (455.5)	0.406†† (0.305)	920.2†† (424.4)
Equalise	0.394*†† (0.345)	857.1 (564.1)	0.436†† (0.320)	928.0 (449.5)
Total	0.378 (0.329)	831.1 (512.8)	0.421 (0.313)	924.1 (436.7)

Table 13: Average cooperation behaviour among redistribution groups for those who were subject to the minimise rule and the equalise rule in stage one and stage two

Figure 8 plots the average contribution behaviour by redistribution policy over all sixteen rounds of play. The dotted line after round eight indicates when the redistribution policy was implemented. The figure indicates that the “reset” effect that is characteristic of the second stage of public good games (Andreoni 1988) is present, with both treatments increasing their contributions at the start of the second stage of play. Panel 8a plots the average fraction contribution and panel 8b plots the average total group contribution amount. The plots of behaviour over time show very similar trends although there a slight divergence in later periods, with equalised groups exhibiting arguably slightly more cooperative behaviour.



(a) Average fraction contributed

(b) Average level of public good provided

Figure 8: Distribution of the contributions to the public pool in groups where redistribution took place, comparing a rule which minimised inequality to one which eliminated inequality

7.3.2 The decline in cooperation is more pronounced when inequality is not eliminated by redistribution relative to when inequality is fully eliminated

Figure 8 panel 8a shows that on average fraction contributions to the public pool decline in the second stage relative to the first stage. Panel 8b reveals the same trend in public good provision at the group level. This is supported by the estimates of average fraction and group total contributions in stage one and two reported in table 13. On average individuals in the minimise treatment contribute 41% of their endowments in stage one, while the stage two average fraction contribution is 36%. On average individuals in the equalise treatment contribute 43% of their endowments in stage one and 39% in stage two. For both groups total group contributions are also higher in stage one.

Almost all of the differences between stage one and stage two for the two redistribution policies are shown to be significant at the 5% level. Both minimise and equalise group individuals contribute significantly lower fractions of their endowments in stage two on average. For the minimise group there is a large and significant decline in the average level of public good provided in stage one and stage two, with average stage two total group contributions lower by 115 tokens on average. This is in contrast with the equalise treatment in which the average total group contribution is not statistically different in stage one and stage two, thus under the equalise intervention, cooperation is sustained but not improved.

7.3.3 Individuals subject to inherited inequality are significantly less likely to reset their public good contributions in response to redistribution compared to individuals subject to lottery-determined inequality

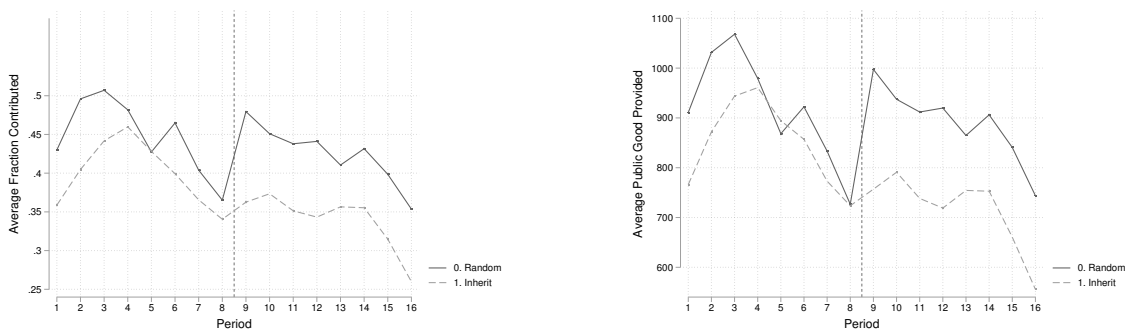
To test whether inheritors respond to redistribution differently to lottery recipients, table 14 presents the estimates of average cooperative behaviour indicators. Columns one and two present the estimates for stage two and columns three and four present the estimates for

stage one to enable comparisons of how behaviour adjusts in response to the redistribution rule.

Allocation Method	Fraction Contribution	Public Good	Fraction Contribution S1	Public Good S1
Random	0.425*** (0.352)	965.2*** (556.2)	0.447 (0.335)	952.4 (444.6)
Inherit	0.340*** ††† (0.305)	721.4***††† (446.4)	0.400††† (0.292)	901.0 ††† (429.6)
Total	0.378 (0.329)	831.1 (512.8)	0.421 (0.313)	924.1 (436.7)

Table 14: Average behaviour indicators for recipients of inheritance and random endowments in stage one and stage two

On average, recipients of randomly determined endowments contribute 43% of their endowment to the public pool in stage two while inheritors contribute 34% of their endowment. T-tests reveal that the differences in average fraction contributed is significant. The differences in average public pot are very large with the average group pot in a lottery group of 965 tokens and the average pot in an inheritance group of only 721. This finding is robust, the difference is significant at the 0,1% percent level. The evidence shows that recipients of random endowments are significantly more cooperative on average than those who receive inherited endowments in stage two of the experiment.



(a) Average fraction contributed by period (b) Average level of public good provided

Figure 9: Distribution of the contributions to the public pool in groups where redistribution took place, comparing lottery recipients to inheritors

The plots in figure 9 reveal a major difference in behaviour patterns over the eight rounds of stage two play for the inheritors and lottery recipients. While lottery recipients exhibit

the anticipated “reset” behaviour in the ninth period of play, the first round after the redistribution, inheritors do not exhibit any significant increase in contribution in round nine. The absence of a reset effect among inheritors in round nine is what drives the gap in cooperative behaviour between lottery recipients and inheritance recipients. Both plots follow a similar shape in rounds nine to sixteen - fairly flat over the first five periods then a decay in contributions over the final three periods. The impact of the reset effect is a remarkably strong ability to sustain cooperative behaviour. The average pot size and average fraction contribution in lottery groups remains at levels comparable to those observed in the first stage of play. Although there is a decay in contributions in the final three rounds, the average final round fraction contribution and level of public good provided is only just lower than their round one counterparts. Moreover, the extent of decay is markedly less than the rate of decay observed in the inheritance groups.

7.3.4 Inheritors are unable to reestablish cooperative norms after redistribution while lottery groups sustain cooperation after redistribution.

The decay from stage one to stage two is also evident in a comparison of the average cooperation indicators in the first two columns of table 14 relative to the second two columns which present the stage one comparison. In stage one, average fraction contributions and public goods are fairly similar. Lottery recipients contribute around 45% of their endowment, inheritors 40%. Lottery groups have an average total group contribution of 952 tokens, inheritors 901. In stage two, lottery recipients sustain these levels of cooperation, with an average of 42% of endowment contributed and an average public pool of 965 tokens. In inheritance groups in stage two the decline is striking. Individuals contribute only 34% of their endowment on average and groups have an average pool size of 721 tokens.

The t-tests show that the reductions in contributions from stage one to stage two for inheritors and inheritor groups are significant. In lottery groups, there is no significant

difference in contribution behaviour from stage one to stage two. Thus, redistribution is compatible with sustained levels of public good provision among lottery recipients, but among inheritors, redistribution fails to reestablish cooperation and appears to be associated with reduced cooperation.

7.4 Does prior material status matter for responses to redistribution policies

It is plausible that participants perceive the redistribution differently depending on whether they experienced the redistribution as a tax or as a grant. This will depend on whether the individual had a high or low endowment in the stage one public good game. There are two potential effects of stage one endowment. The first is an anchoring bias where the individual's beliefs and expectations about the public good game are shaped by their experiences in the first stage play. The second possibility is that individuals shift their contributions to the public pool to correspond to their new endowment level.

7.4.1 There are no significant difference in the average stage two behaviour of those with high and low endowments

Table 15 presents the average fraction contribution estimates for individuals who were originally high and low types in stage one. The estimate of average fraction contributed to the public pool is very similar for both endowment types. Those who previously had low endowments contribute 38% of their endowment to the public pool on average in stage two. Those who previously had high endowments contribute just under 38%.

T-tests fails to find any significant differences in the average fraction contribution by prior material status. This implies those with previously high endowments and those with

	Fraction Contribution S1	Fraction Contribution S2
<u>Endowment Amount</u>		
Low	0.382†† (0.338)	0.429 †† (0.323)
High	0.376 †† (0.316)	0.416 †† (0.299)
Total	0.379 (0.327)	0.422 (0.311)

Table 15: Average cooperative behaviour among those who received high and low endowments in stage one

previously low endowments contribute similar fractions of their endowment to the public pool in stage two. Importantly, the minimise treatment still has inequality so equal fraction contributions could imply differing absolute contributions in that treatment, a possibility that will be examined in a later section.

Figure 10 plots the average fraction contributed to the public pool over the sixteen rounds of play, separated by endowment level in stage one. The plot reveals lines that are very close together and cross one another repeatedly. When separated by endowment level, the reset effect is apparent in round nine, albeit slightly weaker among high endowment recipients. Thus, both attempt to reset public good contributions and both experience a decay over the eight rounds of play in the second stage. The reset is fairly weak and does not reach the levels of average contribution observed in the first stage of play. In sum, the average reactions to redistribution appear no different for high and low endowment recipients. This is interesting, because in half of the sample (the minimise treatment), there are still differences in the endowments of high and low participants. This implies that in contributing the same fraction of endowment to the public pool, they are contributing different amounts in absolute terms, an inference which is confirmed by a t-test on the difference between average fraction contributions from highs and low in the minimise sub-sample. This implies lower contributions from those with low endowments than the contributions from those with high endowments.

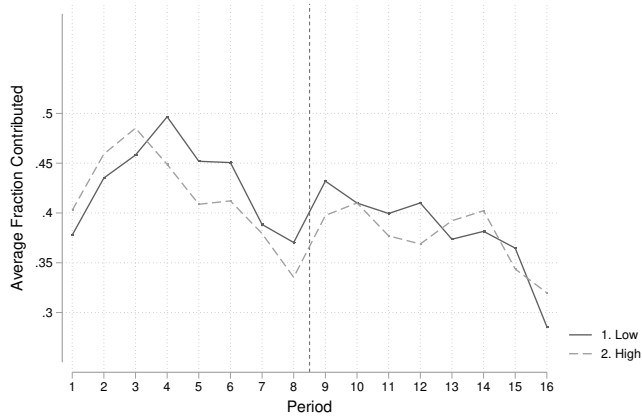


Figure 10: Distribution of the contributions to the public pool by individuals who had high or low endowments in stage one

7.4.2 Material status makes no difference to reset behaviour on average

Consistent with the weak reset effect observed in figure 10, both the high and low subsamples have lower average fraction contributions in the second stage than in the first stage. Column two of table 15 reports the estimates of average fraction contributions in stage one. These estimates are very similar for high and low endowment recipients on average and both are reduced by similar magnitudes. The t-tests in table 15 show that both high and low individuals' reductions in average fraction contribution in stage two are significant.

Both high and low endowment individuals adjust their endowments downwards in stage two on average. In stage two high endowment individuals have their endowments reduced by the redistribution rule and low endowment individuals have their endowments increased by the redistribution rule. Thus, when both low endowment individuals reduce their fraction contributions in stage two, high endowment individuals reduce their fraction contributions by a greater amount in absolute terms than do those with low endowments.

7.5 Do interacting contexts matter for reactions to redistribution?

In the previous chapter, it was shown that the group context, specifically an individual's relative position in a group and inheritance status, changed their tendency to behave cooperatively in a public good game. As redistribution rules are another contextual frame of the endowment distribution of the groups, the same tests for the importance of context should be performed for the redistribution stages of the public good game.

7.5.1 Differences in cooperative behaviour between inheritance and lottery recipients are more pronounced for the equalise intervention than for the minimise intervention

When comparing inheritors to lottery recipients for the two redistribution rules, all endowment and pot size effects are eliminated. The individuals are identical except for the endowment determining process, with no differences in average endowment or group pot size. Therefore, these results are free of any mechanical confounds and purely measure whether participants react differently to considering their endowments and the endowments of others to represent real-world inheritance status as opposed to considering endowments to represent the outcomes of a random process. Table 16 presents the estimates for the two redistribution policies and the two endowment determining processes, compared in pairs for the differences in behaviour.

The first two rows in table 16 present the average fraction contributions for the inheritors and lottery recipients who were in groups that experienced the minimise redistribution intervention in stage two. The estimates of stage two behaviour are presented in columns one and two of the table. The average fraction contribution for the lottery sub-sample is 40% and is 33% for the inheritance sub-sample. The difference in average contribution corresponds to a difference in average public good. In the random minimise sub-sample, the average

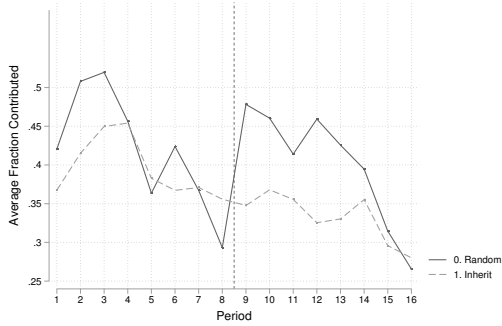
	Fraction Contribution	Public Good	Fraction Contribution S1	Public Good S1
<hr/>				
Minimised Inequality				
Random	0.401*** (0.330)	837.1 (462.8)	0.419 (0.336)	874.5 (424.1)
Inherit	0.332*** ††† (0.294)	780.2†† (450.0)	0.395††† (0.280)	955.4†† (422.8)
<hr/>				
Equalise				
Random	0.448*** (0.370)	1085.1*** (609.4)	0.473 (0.332)	1025.4 (452.7)
Inherit	0.347***††† (0.315)	659.4***††† (435.7)	0.405††† (0.305)	843.5††† (430.9)
<hr/>				

Table 16: Average behaviour indicators among redistribution groups comparing those whose endowments were allocated randomly to those whose endowments were determined by inheritance status

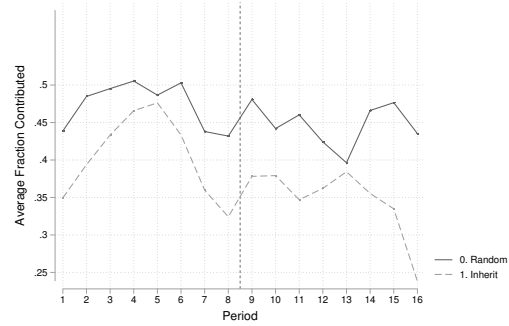
public good is 837 tokens and in the inherit sub-sample it is 780 tokens. The t-test of the comparison reveals that the difference in average fraction contributed between lottery and inheritance recipients is significant. Inheritors are significantly less cooperative, contributing smaller fractions of their endowment on average. A t-test reveals that the average difference in total group contribution is insignificant. Thus the differences in average fraction contribution between lottery and inheritance recipients in the minimise treatment do not translate into differing levels of public good provision.

The plots of average fraction contribution by round in panel 11a of figure 11 reveal that this difference in the average is primarily driven by a marked reset effect in round nine for lottery recipients that is not matched by inheritors. Among inheritors there is no evidence of a reset effect. Interestingly, there is a very steep decline in average fraction contributions among lottery recipients from round 12 onward, that catches up to the decay among inheritors in round sixteen.

The overall behaviour observed when comparing individuals who were in groups where inequality was eliminated entirely is very similar to the behaviour observed for the redistribution rule which only reduced inequality. Rows three and four of table 16 present the average fraction contributed by equalise inheritors and equalise lottery recipients. Contributing 44% of their endowment to the public pool on average, those with randomly determined endowments contribute larger fractions on average than those with lottery endowments, who



(a) Minimised inequality intervention



(b) Equalise intervention

Figure 11: Distribution of the fraction of endowment contributed to the public pool in groups facing different redistribution rules, comparing lottery recipients to inheritors

only contribute 34% of their endowment on average. Moreover, differences in the average level of public good provision are substantial. In random groups the public pot had 1085 tokens on average, in inherit only 659 tokens on average. T-tests of the differences in these averages confirm that the difference is significant. Together they show strong evidence of significant, large differences in average behaviour. Lottery recipients contribute a larger fraction of their endowments to the public pool in stage two by ten percentage points and have larger average public pools by more than 400 tokens.

7.5.2 Lottery recipients contribute a similar fraction in the equalise treatment to the fraction they contribute in the minimise treatment

The plots of the average fraction contributed to the public pool over time are presented in figure 11 panel 11b. The figure shows that when redistribution fully equalises endowments, there is only a small reset effect. The average fraction contributes in round nine are however comparable in size to the average fraction contributions in round one in the prior stage. Additionally, lottery recipients contribute a similar fraction in the equalised treatment to the fraction they contribute in the minimise treatment. The biggest divergence in average fraction contribution occurs in rounds fifteen and sixteen where inheritors experience a steep

decay in contributions on average while lottery recipients experience only a slight decay in average fraction contributions. Overall the plot provides evidence of a fairly strong capacity to sustain cooperation. Compared to the plot in panel 11a cooperation among lottery recipients in the equalise treatment is sustained much more strongly than in the minimise treatment.

Under both redistribution policies inheritors exhibit less cooperative behaviour than lottery recipients. However, the extent of difference is much larger in the equalise treatment. It appears that the equalise redistribution is very effective at triggering reset behaviour in lottery groups, but ineffective at triggering a reset among inheritors. This is where the difference between the cooperation of inheritors and lottery recipients is greatest. The redistribution policy appears not to trigger a reset reaction except from recipients of random endowments under the minimise redistribution rule.

When t-tests of differences for the four treatments from stage one to stage two were performed and significant differences are indicated with daggers (\dagger). In both of the lottery treatments there is no difference between stage one and stage two behaviour on average. In both of the inheritance treatments there is evidence of a significant reduction in contributions in stage two. It appears that inheritors are equally unresponsive to the two redistribution interventions as the reduction in average contribution behaviour among inheritors is very similar for both the equalise and minimise treatments.

7.5.3 High and low inheritors both reduce contributions to the public good after the redistribution

The different policies are now compared to examine whether individuals who received high and low endowments in stage one respond differently to the two redistribution policies. Table 17 presents the average fraction contributions for the four sub-samples in stage one and stage

two. Individuals with low endowments behave very differently in stage two depending on which treatment they have been assigned to. Those in the lottery treatment contribute 44% of their endowment to the public pool on average, while those in the inherit treatment contribute 33% of their endowment on average. The pattern is similar among those with high endowments. In the lottery treatment high endowment recipients contribute 40% of their endowment and in the inheritance treatment high endowment recipients contribute only 35%.

	Fraction Contribution	Fraction Contribution S1
<hr/>		
<u>Low Endowment</u>		
Lottery	0.446*** (0.357)	0.407 (0.339)
Inherit	0.331***†† (0.313)	0.378†† (0.295)
<hr/>		
<u>High Endowment</u>		
Lottery	0.408** (0.339)	0.410 (0.301)
Inherit	0.351** †† (0.294)	0.454 †† (0.309)
<hr/>		

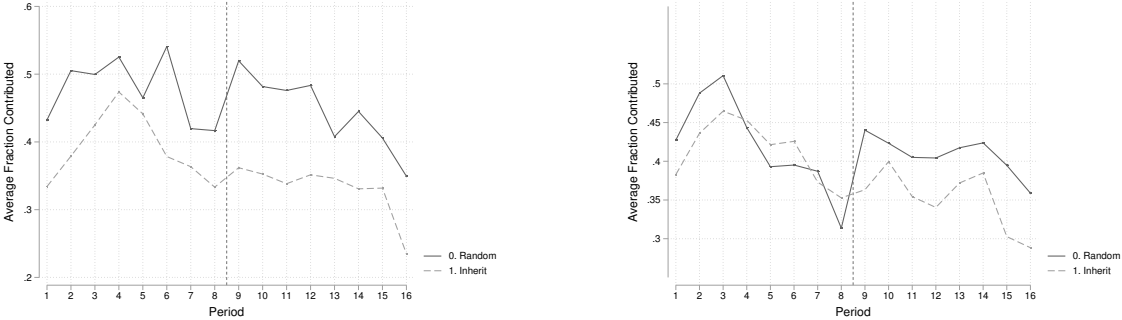
Table 17: Testing for significant differences for those with inheritance and random endowment recipients subject to the two different redistribution rules

T-tests confirm that both of these differences are significant. However, the difference in average contribution behaviour between lottery and inherit is much larger for those with low endowments than for those with high endowments. This suggests that in addition to inheritance groups being less cooperative than lottery groups on average, those who received low endowments in inheritance groups are particularly uncooperative in stage two of the experiment.

7.5.4 High endowment inheritors respond much more negatively to the redistribution interventions than low endowment recipients

The plots of the average fraction contributed over time in figure 12 for the random and inherit sub-samples support this. Panel 12a plots the average fraction contributed by the low endowment recipients. Once again it is clear in both inheritance sub-samples that the

reset effect is minimal. Neither high or low inheritors fully reset their cooperative behaviour in the first round of stage two and the reset is particularly weak among low endowment recipients. There is a clear divergence in average fraction contributed in stage two between the low lottery and inheritance recipients. The low lottery types reset their behaviour at the start of stage two and sustain fairly high levels of cooperation. The low inherit types do not reset their behaviour, have a fairly flat trend in average contributions over time and a steep decline in the final period. By contrast, high endowment recipients in the lottery and inheritance sub-samples are more similar. Although average contributions of lottery types are above those of inheritance types for all rounds, the gap between the two is smaller.



(a) Low endowment types

(b) High endowment types

Figure 12: Distribution of the average fraction of endowment contributed to the public pool in groups facing different redistribution rules, comparing high and low endowment recipients

The t-tests of the difference between stage one and stage two average behaviour reveal that only the inheritors adjust their average fraction contributions downwards after the redistribution intervention. Low endowment inheritors reduce their average fraction contribution by nearly 5 percentage points. High endowment inheritors reduce their average fraction contribution by more than 10 percentage points. High inheritors adjust their average fraction contributions downwards by much more than low inheritors do. Moreover, the downwards adjustment in average contributions from low inherit individuals actually translates into a slight (insignificant) increase in absolute contribution while the high inheritors' downwards adjustment corresponds to a large downwards adjustment in absolute terms (of 121 tokens).

This suggests that high inheritors respond more much negatively to the redistribution intervention than low inheritance recipients do.

Overall, inherit high and low average behaviour is fairly similar in stage two. Relative to their lottery counterfactual groups those who received low inheritances exhibit particularly low levels of cooperation. Essentially, among lottery low individuals a tendency for higher contributions is observed that is absent among the low inheritors. This suggests that low lottery types continue to attempt to sustain public good provision after the redistribution while the low inheritors do not. High inheritors adjust their average fraction contributions downwards substantially after the redistribution. The net result is that inheritance groups have substantially lower levels of public good as both high and low types reduce their contributions after the redistribution.

7.5.5 High endowment recipients reduce their contributions to the public pool in stage two on average while low endowment recipients increase their contributions to the public pool on average in stage two

It is plausible that those who have high and low endowments in stage one react differently to the two redistribution policies. This possibility is examined in this section. Table 18 reports the estimates for average contribution behaviour for individuals with high and low endowments, separated by redistribution rule.

Column one presents the estimates of contribution behaviour in stage two. All four sub-population average fraction contributions are within five percentage points of each other. Overall both high and low endowment recipients contribute larger fractions of their endowment in the equalise treatment relative to the minimise treatment. Low endowment recipients in the minimise treatment stage two contribute 36% of their endowment on average while low types in the equalise treatment stage two contribute 40% of their endowment.

High minimise individuals contribute 37% of their endowments and high equalise individuals contribute 38% of their endowments on average.

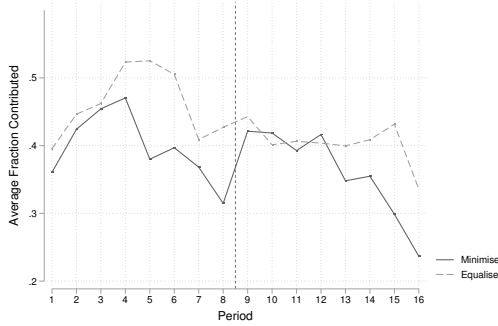
	Fraction Contribution	Fraction Contribution S1
<hr/>		
<u>Low Endowment</u>		
Minimise	0.361 (0.328)	0.396 (0.313)
Equalise	0.404†† (0.347)	0.462†† (0.331)
<hr/>		
<u>High Endowment</u>		
Minimise	0.371†† (0.293)	0.425†† (0.295)
Equalise	0.381 (0.337)	0.408 (0.302)
<hr/>		

Table 18: Average contribution behaviour for recipients of high and low endowments under the two redistribution policies

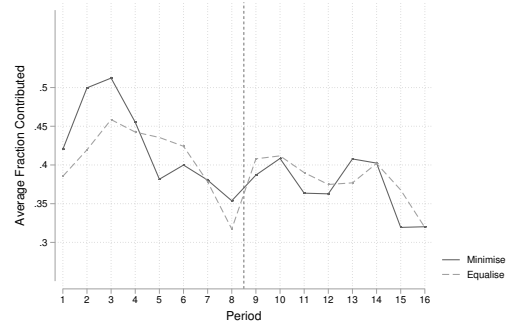
T-tests reveal that the differences between the minimise and equalise average fraction contribution are insignificant for both high and low individuals. Thus the lows in the two treatments contribute fractions of their endowments that are not statistically different on average and highs in the two treatments contribute fractions of their endowments that are not statistically different.

Figure 13 presents plots of the average fraction contributed to the public pool in each round. Panel 13a plots the average fraction contribution made by low types, separated by redistribution policy. Among low types the plot of average contributions in the equalise treatment lies very close to the minimise treatment until round four when the minimise treatment begins to see a steeper decay in contributions. The low equalise sub-sample appears to have a particularly weak reset of behaviour in the first round of stage two play. Both treatments experience a decay in contributions, but it is more pronounced in the minimise treatment. In panel 13b the two plots of average behaviour for high types are very close together, crossing one another many times. This illustrates that high endowment recipients exhibit very similar behaviour in the second stage of the experiment independent of the redistribution policy they experience.

To examine whether any of the sub-samples have adjusted their behaviour in response to



(a) Low endowment recipients



(b) High endowment recipients

Figure 13: Distribution of the fraction of endowment contributed to the public pool in groups facing different redistribution rules, comparing lottery recipients to inheritors

the redistribution interventions, t-tests are conducted to establish whether there are difference between each policy and endowment amount sub-population's average stage one and stage two contribution behaviour. The low minimise stage one and stage two comparison reveals no significant difference in the average fraction contributed before and after the minimise redistribution. This implies an increase in absolute contribution because low types after the minimise redistribution have increased endowments by 100 tokens. The comparison of individuals who had low endowments in stage one and were subject the equalise redistribution in stage one and stage two reveal that they reduce the fraction they contribute to the public pool on average in stage two. However, this reduction is small and actually translates in an increase in contribution in absolute terms.¹⁸ The comparison of the stage one and stage two behaviour high endowment individuals who were in groups which faced the minimise redistribution rule shows that high endowment individuals reduce the fraction of endowment they contribute to the public pool after the redistribution. This translates into around a 75 token reduction in the average contribution of high types in the minimise treatment in stage two.

It is interesting that high endowment recipients do not adjust the fraction of endowment they contribute to the public pool in the equalise treatment on average, while they do in

¹⁸Low equalise types contribute 50 more tokens on average in stage two than they did in stage one

the minimise treatment. Of course, the reduction in their endowments imply that holding the fraction they contribute constant translates into a lower average contribution in absolute terms. In absolute terms high endowment individuals reduce their contributions on more average after the minimise redistribution intervention than they do after the equalise redistribution.

7.6 Conditional estimates of the effect of treatment

Having now established the unconditional treatment effects of the redistribution policies, regression analysis is performed. The unconditional estimates offered evidence that the equalise intervention was generally better for sustaining cooperative behaviour in stage two and that the inheritance framing had a strong negative effect on the capacity for groups to reset their cooperation norms relative to lottery assigned endowment recipients. The regression estimates will account for group-specific effects and individual characteristics, or conditional treatment effects while testing whether these effects remain present. Each regression uses ordinary least squares with robust standard errors to account for the time series nature of the data.

7.6.1 Regression analysis confirms that both high and low inheritors are less cooperative in stage two than their lottery counterparts and that individuals who faced the equalise intervention are more cooperative in stage two than those who faced the minimise intervention

Table 19 reports the estimated coefficients on the treatment indicators when OLS regressions are performed for the stage two sub-sample. These are estimates for whether there are any significant differences in the average fraction contributed to the public pool in the stage two experiment predicted by the treatment variables and their interactions. Controls for period

of the game, individual characteristics and group characteristics are included in each of the regressions.

Dependent variable: fraction contributed	1	2	3	Low	High
High Endowment	0.00855 (0.39)	-0.0404* (-1.99)			
Equalise Policy	0.0369 (1.67)		0.0191 (0.92)	0.0668* (2.21)	-0.0451 (-1.55)
Equalise*High	-0.0511 (-1.69)				
Inherited Endowment		-0.0579** (-3.02)	-0.0159 (-0.85)	-0.0197 (-0.74)	-0.0162 (-0.56)
Inherit*High		0.0666* (2.39)			
Inherit*Equalise			-0.0266 (-1.00)	-0.0424 (-1.11)	0.0424 (1.10)
Observations	1888	1888	1912	936	952
R^2	0.085	0.306	0.294	0.355	0.301

Table 19: OLS regression estimates of the determinants of the average fraction contributed to the public pot in the stage two experiment

The first column in table 19 reports the estimated effects of the interaction of previous stage material status and redistribution policy. None of the coefficients estimate a significant effect. This suggests that there is no powerful interaction effect between endowment amount and group endowment distribution in the stage two experiment. In the unconditional analysis a significant relationship was found between stage one endowment amount and the average reaction to stage two redistribution policy. The insignificance of the results in the regression analysis suggest that the relationship is mediated by individual and group-level heterogeneity.

In column two the interaction of inheritance status and material status offers evidence of a significant effect on contribution behaviour. A dummy set equal to one if an individual was simultaneously a recipient of a high endowment and a recipient of an inheritance determined endowment. Relative to a low lottery recipient, a high inheritance recipient contributes around three percentage points less of their endowment to the public pool. Relative to a high lottery recipient, a high inheritance recipient contributes under one percentage point more of their endowment to the public pool on average. Relative to a low lottery recipient, a low inheritor contributes around six percentage points less of their endowment to the public pool. These results are consistent with the results of the unconditional estimates which found that both high and low inheritors are less cooperative than the lottery recipient

counterfactual, albeit with smaller differences in average contribution. The results of the regression suggest that low inheritors are less cooperative in stage two and are more markedly different to their counterfactual lottery groups than high inheritors are.

In column three the estimates of the average fraction contribution are shown to not be explained by the interactions of inheritance status and redistribution policy on average. In column four the sample is limited to the sub sample of only those who received low endowments. Here, those with low endowments in the equalise treatment contribute significantly larger fractions of their endowment to the public pool than those with low endowments in the minimise treatment by more than six percentage points. While this interaction was not examined explicitly in the unconditional estimation section, the result is consistent with the equalise treatment cells appearing to be more cooperative on average relative to minimise treatment cells. This suggests that those with low endowments are particularly responsive to the equalise policy relative to the minimise policy, adjusting their average fraction contributions further upwards in the former. In the final column none of the interactions are significant predictors of the contribution behaviour of high endowment recipients.

7.6.2 Regression analysis confirms that groups of inheritors provide lower levels of public good on average, especially after the equalise intervention

Table 20 reports the estimates for the average level of public good provided by each group. These estimates will establish whether shifting the distribution of endowments while holding the total number of group tokens constant has any effect on the level of public good provided. These estimates are at the group level, with a control for the lagged total group contribution included and a control for period of play included. The first two columns are regressions limited to the sample of stage two observations, controlling for round of play. The third column controls for stage and includes interactions terms set equal to one if an individual is subject to the relevant treatment intervention and the observation is in stage two of play.

Dependent variable: fraction contributed	1	2	S2
Equalise Policy	34.33 (1.28)	100.6* (2.29)	26.61 (0.91)
Inherited Endowment	-107.4*** (-3.82)	-48.69 (-1.19)	22.18 (0.75)
Inherit*Equalise		-120.1* (-2.13)	
Stage Two			249.1*** (4.60)
Inherit*S2			-135.7*** (-3.36)
Equalise*S2			8.164 (0.21)
Observations	476	476	894
R^2	0.679	0.683	0.636

Table 20: OLS estimates of the determinants of group public good provision in stage two and in stage two relative to stage one

Column one of table 20 reports the effects of the equalise treatment and the inherit treatment on the average level of public good provision in stage two. On average being in an inheritance treatment is associated with a 107 token reduction in the average number of tokens a group had contributed to the public pool. In column two, an interaction term is included. The estimated effect of a group being comprised of inheritors who were subject to the equalise redistribution rule is a 121 token reduction in the average total group contribution amount relative to groups of inheritors subject to the minimise redistribution rule. Moreover, groups of inheritors subject to the equalise redistribution rule have lower average group contributions than groups of lottery recipients subject to the equalise rule by 48 tokens. While inheritance groups have generally lower average levels of public good provision in stage two than lottery recipients, this effect is largest in the inheritance equalise groups. Again, this is consistent with the descriptive results from prior sections. It appears that the failure to reset among inheritors was particularly weak relative to the reset behaviour of other treatment groups who were subject to the equalise intervention. Under even those most powerful reset of the group distribution, inheritors remain on the trajectory observed prior to the redistribution, resulting in lower levels of public good provision.

The final regression in table 20 reports the effect of the treatment variables interacted with a dummy which is equal to one for all stage two observations. Controls for stage one treatment cell, stage, period and group previous stage total contribution are included.

Relative to groups of inheritors in stage one, groups of inheritors in stage two have lower average total group contributions by 135 tokens. This result is significant at the 1% level. This demonstrates that inheritors experience a decline in average group contributions in stage two relative to stage one play that is much more pronounced than for lottery recipients. This further consolidates the evidence that inheritors experience a more rapid and pronounced decline in cooperation than those with lottery determined endowments.

7.6.3 Regression analysis confirms that being the recipient of an inheritance determined endowment cause a significant reduction in average fraction contributed to the public pool in stage two

Table 21 presents estimates of the effect of the three treatment variables in stage two on average stage two fraction contribution. The regressions have average fraction contributed to the public pool in stage two as the dependent variable. The regressions include controls for average stage one fraction contribution as well as group and individual characteristics. The results of these regressions will establish whether the differences observed in the stage two data are carried through from stage one behaviour or are the result of a change in behaviour after the redistribution occurred.

Dependent variable: average stage one contribution	Full Sample	Full Sample	Low	High
Inherited*S2	-0.0482*			
	(-2.00)			
Equalise*S2	-0.00414			
	(-0.17)			
High*S2	-0.0203			
	(-0.82)			
Stage one average fraction	0.667***	0.666***	0.589***	0.775***
	(12.24)	(12.21)	(6.89)	(9.48)
Inherit*Equalise*S2		-0.0538	-0.0549	-0.0195
		(-1.54)	(-1.01)	(-0.39)
Inherit*Minimise*S2		-0.0659	-0.0837	-0.0693
		(-1.91)	(-1.56)	(-1.40)
Lottery*Equalise*S2		-0.0225	-0.0161	-0.0213
		(-0.62)	(-0.29)	(-0.41)
Observations	236	236	117	119
R ²	0.594	0.594	0.611	0.641

Table 21: Testing for significant differences between inheritance and random endowments in unequal groups in which the inequality has been reduced by a redistribution rule

Column one presents the estimates of the effects for three dummies for the different treat-

ment conditions. The dummy indicator equal to one for individuals in the stage two inheritance treatment is negative and significant. Thus, the average fraction contributed in stage two is 4,8 percentage points lower for those whose endowments were determined by an inheritance process. This is consistent with the evidence that inheritors fail to reset their behaviour in round nine and instead continue to experience a decay in average fraction contributions over the subsequent eight rounds.

The final three regressions present estimates of the interactions of the redistribution policies with inheritance status. The second column of the table presents the estimates for the full sample, the second column presents estimates for the sub-sample of those with low endowments only. The final column presents estimates for the sub-sample of those with high endowments only. All three columns offer no evidence of significant interaction effects causing changed contribution behaviour in stage two. The stage one average fraction contributed is estimated to have a large and positive effect on the average fraction contributed in stage two, particularly for those with high endowments.

8 Discussion

In this section the key results of the experiments are interpreted and the possible implications of these results for cooperation behaviour in other settings are discussed. Additionally, study limitations are investigated and recommendations for future research are made.

8.1 What are the effects of inherited endowments in a public goods game?

It is clear that the inheritance framing caused different behaviour to the behaviour observed by those who received lottery determined endowments. This suggests that the participants in this experiment considered inherited material status to not be equivalent to a process which allocates material status by chance. The contribution behaviour of inheritors is significantly different to that of the recipients of randomly determined endowments in both stages of the experiment.

In stage one, inheritors of low and high endowments differ in their reactions to inequality. Those with high inherited endowments are more cooperative in equal groups comprised exclusively of others with high inherited endowments than they are in unequal groups with two individuals with high endowments and two with low endowments. On average those who inherited high endowments are significantly less cooperative than those with randomly assigned high endowments when regressions that account for demographic and group characteristics are performed. Those with low inherited endowments are significantly more cooperative in unequal groups than they are in equal groups comprised of only others with low inherited endowments. Those with low inherited endowments are found to be more cooperative than those with randomly assigned low endowments in regression analysis. The unconditional estimates of average behaviour indicated that individuals who inherited low endowment amounts exhibited behaviour consistent with a degree of disengagement from the game. Even though their average contributions were higher than those whose endowments were randomly assigned, inheritors were significantly less likely to be free riders and full cooperators indicating a degree of disinterest in attempting strategies closer to either the socially optimal strategy or the Nash equilibrium strategy.

This suggests that those who inherit high and low endowments have reason to differ in their

preferences for the distributional arrangement of their communities. While recipients of high inherited endowments do better in equal groups with exclusively other high endowment types, recipients of low inherited endowments do better in unequal groups. This result appears to lend support to the argument that inequality can increase social benefit by creating a setting in which those with high material status contribute to public goods that the poor benefit from (Itaya et al. 1997). In this experimental setting, those with high material status are able to contribute more than those with low material status could, meaning that those with low material status benefit from inequality relative to being an equal community of exclusively those with low endowments. Those with low material status therefore have reason to vote in favour of social arrangements which include those with high material status in their communities. However, those with high material status have conflicting interests. They create substantially more public good in equal communities of exclusively others with high endowments. Thus, those with high material status have an interest in promoting segregation on the grounds of material status.

Outside of a lab setting, those with low material status can vote to support the policies which promote their interests. Median voter theory hypothesises that in an unequal society the median voter is relatively poorer and more inclined to vote in favour of the interests of the poor (Milanovic 2000, Finseraas 2008).¹⁹ Thus, a preference for more unequal communities may attract popular support. However, where this preference from those with low material status conflicts with the preferences of those with high material status, those with high material status have mechanisms other than voting which they may use to ensure their preferences prevail. For example they may be able to buy political influence through campaign donations (Campante 2011), or support practises which cause segregation at the district or neighbourhood level. Segregation has been clearly shown to be disadvantageous to those with low material status in this experiment. Segregation will perpetuate the dynamic where the rich are able to cooperate in providing public goods and gaining further material

¹⁹Assuming that an individual's preferences track their interests.

advantage while communities comprised of individuals with low material status struggle to achieve cooperation or meaningful levels of public good provision. This implies that low endowment inheritors inherit a twofold disadvantage relative to high endowment inheritors. In addition to inheriting a relatively lower amount of money, or a lower position in society, inheritors of low status are born into communities with lower levels of group cooperation or solidarity. Either those of low material status are born in communities where they are isolated from the provision of public goods or they are born in communities where they must exert high levels of cooperative behaviour in an attempt to induce cooperation from others who would prefer to exclude them from the community. Thus, the implications of the behavioural responses to inherited inequality observed in this study are further inequalities in the capacity to attain public goods.

One potential solution to this dynamic was tested in the second stage experiment conducted in this study. Redistribution can be used to create more equitable distributions of material status in a community. If these more equitable communities are more similar to the communities made of exclusively those with high endowment status, the redistribution may be able to stimulate increased group cooperation and consequently increased public good provision. Inheritors exhibited less cooperative behaviour in stage one on average. Thus, policies which reset the dynamic of contribution are particularly important for offsetting the reductions in cooperation caused by inherited inequality.

The stage two experiment revealed that while redistribution may be able to prevent decays in public good provision, both of the redistribution policies were unable to stimulate increased cooperation. The policy which fully eliminated endowment inequality was slightly better at promoting sustained cooperation than the policy which only reduced inequality. However, recipients of inheritance determined endowments were completely unresponsive to the equalise intervention. Inheritors were shown to be particularly prone to decays in cooperation after the redistribution intervention and inheritors of high endowments in stage

one especially prone to uncooperative behaviour, adjusting their contributions downwards in absolute terms on average in stage two. This suggests that inheritance recipients do not consider their endowment to be allocated by chance (Fong 2001). Instead, the history associated with the inheritance frame is clearly salient and difficult to overcome.

The prior stage trajectory of average contributions and prior information about the others in an individual's group dominated the effect of the redistribution such that no reset effect was evident at the start of the stage two experiment for inheritors. This demonstrates that the information about the inheritance status of others in a group was a particularly powerful piece of information for shaping cooperation behaviour. The failure of the redistribution policy to reset the cooperation norms among inheritors suggests that the experimental participants considered the inheritance frame more relevant to their contribution decision than the reset intervention. The meaning associated with an inheritance status is evident in the stage one cooperation behaviour of high types who are able to trust other high inheritors to contribute to the public good and in the cooperation behaviour of low types who were unable to trust one another to the same extent. The relatively lower levels of cooperation in unequal groups of inheritors relative to unequal groups of lottery recipients remain relatively lower and decreasing after the redistribution, suggesting that the redistribution of game endowments was insufficient for establishing perceived equality within groups. This suggests that social division may be persistent in societies even after interventions attempt to redress the inequality. Thus, social division may continue to have adverse effects for those who were disadvantaged that play out through social interactions.

8.2 What motivates the behaviour of inheritors in equal and unequal groups?

In public good game with the payoff structure used in this experiment, an individual can only earn a positive return from the public account if the collective contribution from the other members of the group exceed the contribution made by the individual. This is difficult for high endowment players to be sure of in unequal groups because two of the other members of the group have lower endowments and therefore lower contribution capacity. Thus, the expected contributions of others may motivate the reduced cooperation behaviour observed in unequal groups. The regression analysis did control for the lagged ratio of the contributions of the sum of the contributions of other group members to maximum possible group contribution amount to account for how variation in pot size may motivate contribution behaviour. The coefficient on the inequality dummy remained negative and significant even when this control was included. This suggests that inequality had an additional negative effect on cooperation that was independent of pot size. Thus inequality causes a reduction in cooperative behaviour for at least some community members that arises from a failure of trust in addition to a divergence in contribution interests.

It seems that behaviour in unequal groups is not consistent with an inequality aversion motivation. Those with inherited high endowments do not attempt to redistribute to those with low endowments through their contributions to the public good. Those with inherited low endowments contribute larger fractions of their endowment in unequal groups than in equal groups, suggesting an attempt to stimulate public good provision and a willingness to contribute to the endeavour. This behaviour has no clear effect on group inequality and so is unlikely to be motivated by inequality aversion.

The relationship between contribution behaviour and group distribution is strongest for those received inherited endowments, suggesting that the inheritance frame provides infor-

mation about the behaviour of other group members to the individual that is different to the endowment information provided to lottery recipients. It is likely that the inheritance frame provides players a real-world perception of the types of people they are interacting with the public good game. This explains why the lab intervention to promote greater equality of in-game endowments had few major effects, it does nothing to adjust the real-world inequalities that participants have been made aware of and therefore has no corresponding effect on trust.

Those with high inherited endowments in equal groups were particularly confident about contributing large amounts to the public pool. This is consistent with greater levels of trust arising because the group has closely aligned interests and a powerful piece of information about a common history. These high levels of trust enabled players to do better at overcoming the social dilemma and achieve a level of public good provision that is closer to the socially optimal one.

In groups of recipients of low inherited endowments, the evidence of disengagement and of weaker cooperation in equal groups with others who inherited low endowments suggest lower levels of trust between those with low inherited endowments than among those with high inherited endowments. The literature on the psychological effects of poverty offers some possible explanations for this behaviour. The weak cooperation between low endowment inheritors in equal groups is indicative of beliefs that individuals of this type will not behave cooperatively. This may be the result of a negative stigma towards those with similarly low material status to themselves (Hoff & Pandey 2006). The inheritance frame may be particularly powerful for causing low endowment individuals to internalise negative social attitudes about poverty because inheritance implies a persistence of disadvantage that is beyond the control of the individual (McLeod & Shanahan 1993). This sort of dynamic is consistent with a fatalist view of the world. Moreover, poverty has been shown to cause stress and trigger negative affect, emotional states that are associated with more short-termist, risk

averse and habitual behaviour (Haushofer & Fehr 2014). These behaviours may cause worse decision-making in complex interactions and cause those who inherit a relatively low position in society to be more likely to make choices which perpetuate their low material status. Encouragingly, those with low inherited status do improve their cooperative behaviour in unequal groups where they appear to perceive greater prospects for earnings.

Regression estimates revealed a number of notable differences between the estimates of conditional and unconditional effects of inequality and its interaction with material status and inheritance status. Some results reversed in the conditional estimates and others became insignificant. This suggests that the three treatments, individual and group-level characteristics included in the regression explain a large component of the observed contribution behaviour. In other words, personal identity and circumstance mediated many of behavioural responses to the framing of this experiment. This interaction of different aspects of identity with the different treatment conditions was too complex to fully isolate in this study, however, it is clear that the effects of inequality, material status and inheritance are not orthogonal to one another. This suggests that research which aims to isolate the effects of inherited advantage should take care to consider the mechanisms through which identity may mediate the reactions to the experimental setting. Moreover, focusing on how particular sub-samples or a very large, diverse sample reacts to the of this experiment could help to inform understanding of how different aspects of identity may interact in different settings.

8.3 External validity and future research

The sample used in this study were all university students at the University of Cape Town. The use of university students is commonly considered a limiting factor in the external validity of an empirical study because university students are unlikely to be representative of humans more generally (Jones 2010). University students will be more well-educated and

may be better off than the average individual. Despite these limitations there were good reasons to use university students in this study. Chief among them is the fact that this study is the first to use this method of examining the relationship between inherited endowment status. This meant that using a sample that is intelligent and familiar with responding to surveys and using a computer ensured a more seamless implementation of the method (Gächter 2010). This implies that this research is a clean test of the method. Moreover, the sample recruited for this study is fairly diverse, which suggests that the results presented here do not represent a homogeneous slice of society (Henrich et al. 2010). Participants in this study were from a variety of different faculties of study, with numerous race and language groups represented and more than a hundred of the participants being from a country other than South Africa. The evidence of the importance of inheritance status for cooperation found in this study therefore is suggestive of a potential source of conflicting interests in other settings. This is one area in which further research could build on the results found here and this study offers a useful method for examining the effect of inheritance status in other unequal settings.

A second potential concern in this study is that the relationship between inequality and inheritance status presented here is simply picking up the individual's present wealth status. This is unlikely. The regression estimates included financial aid status as a proxy for financial status. The award of financial aid is determined by a thorough vetting process that scrutinises the capacity for an individual to afford university fees. Thus, financial aid should closely track an individual's financial status. Moreover, The recruitment survey also asked individuals about their own perceived position in society. A comparison of the perceived position of an individual and the individual's grandparents found that only 45 of the study participants ranked themselves on the same step of society as their grandparents. This suggests that participants are unlikely to perceive the endowment allocation process to represent the uninherited wealth status more strongly than it represents inherited wealth status.

It is clear that inherited status had an important effect on cooperation in the provision of public goods. The net effect of inherited status was to reduce cooperation, particularly after the redistribution in unequal groups. Further research could deepen understanding of how inherited status interacts with the setting in which it occurs. The complex mediating effects of individual identity are not fully understood, and may help to explain the variation in responses to inherited inequality observed in this study. While care has been taken in this study to ensure that inequality and group pot size effects can be disentangled, a reality of the experimental design which compares individuals in equal and unequal groups is that they confront differing pot sizes in the equal and unequal groups. Thus, a complementary study to this one would implement the same endowment allocation mechanism but hold group pot size constant while varying inequality. Such a study could establish the pure inequality effect that is independent of pot size considerations. Similarly, a study which compares the redistribution policies implemented here to a second stage without redistribution would provide a benchmark for comparison for the redistribution policies employed in this experiment. This would enable discussion of whether the redistribution policies are better or worse than not intervening in the unequal groups in stage two at all.

Unless policies are able to promote increased cooperation, inequality will persist. Future research could address this by investigating interventions that are able to overcome the uncooperative stage one norms and establish a norm of increased cooperation in the second stage. The critical feature of such policies would be an ability to overcome a history of interaction and the associated expectations created while interacting in an unequal setting.

9 Conclusion

This experiment contributes to developing an understanding of how an individual may adjust their behaviour when in a setting in which their material status is inherited. Cooperation

measured by public good game contributions was found to be increasing in endowment level for inheritors and decreasing in group equality, a result which has important implications for how social and political arrangements address the welfare of community members.

The results in this study align with the evidence in the literature that differing sources of inequality can cause different responses for the individual recipient (Cherry et al. 2005, Njozela et al. 2018) and those who interact with the recipient (Fehr 2018). The evidence presented in this study revealed that inherited inequality was treated as distinct from randomly assigned inequality by the experiment participants in many settings. Generally, the consequences of inherited inequality for behaviour appear more pernicious than those of randomly assigned inequality and eliminating the endowment inequality failed to address the unequal dynamic established during play in the first stage of the experiment.

In unequal groups, inheritors of high endowments were relatively less cooperative than they were in groups of exclusively high endowment individuals while inheritors of low endowments were relatively more cooperative than they were when in groups with exclusively low endowment individuals. Thus, stronger social solidarity in groups of exclusively high inheritance recipients enabled cooperation and relatively high levels of public good provision while the opposite was true for those who inherited low material status. The differing responses to inequality from inheritors of high and low material status demonstrate a potential conflict of interests in unequal societies that may cause those of high and low material status to see the other group as a threat to the realisation of their preferred community arrangement. These conflicting interests are consistent with high inheritors having a preference for segregation, for example.

The social message sent by the inheritance frame was powerful and persistent. The inheritance frame appears to change how much individual trust the others in their group to match their contribution level. High inheritors were better at cooperating with each other than high lottery recipients in equal groups, indicating higher levels of trust. In unequal

groups inheritors were worse at cooperating with each other than lottery recipients were, indicating lower levels of trust. Redistribution policies were unable to reset cooperation norms among inheritors, although they could in the counterfactual sub-sample in which endowments were assigned by lottery. Instead, individuals who inherited high endowments in stage one sharply reduced their contributions in absolute terms in stage two, causing a decay in the level of public good provided in stage two relative to stage one. The persistence of the stereotypes, distrust and psychological harms of poverty suggest that material redistribution may be insufficient for overcoming social divisions. The failure to overcome these divisions may result in sustained disadvantage for those of low status as low levels of public good contribution from those with high endowments will result in little being redistributed from those with large endowments to those with small endowments. These sustained inequalities should motivate future research into more effective redress measures because the traditional redistribution policies appear to have been inadequate.

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10 Appendix

10.1 T-tests of the differences between treatment pairs

	Low-High		Equal-Unequal		Lottery-Inherit	
Fraction of endowment contributed	-0.0412***	(-3.97)	-0.0189	(-1.81)	-0.00662	(-0.63)
Proportion full cooperators	-0.000411	(-0.04)	-0.0161	(-1.64)	0.0320**	(3.27)
Proportion free riders	0.0311**	(3.23)	0.0118	(1.23)	0.0410***	(4.26)
Observations	3612		3612		3612	

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 22: T-Tests of differences in average behaviour by overall treatment feature

	Low Equal-Unequal		High Equal-Unequal	
Fraction of endowment contributed	-0.0784***	(-5.23)	0.0386**	(2.69)
Proportion full cooperators	-0.0371**	(-2.67)	0.00453	(0.33)
Proportion free riders	0.0477**	(3.25)	-0.0228	(-1.82)
Observations	1789		1823	

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 23: T-Tests of differences in average behaviour between recipients of high and low endowments in equal and unequal groups

	Low Lottery-Inherited		High Lottery-Inherited	
Fraction of endowment contributed	0.0350*	(2.33)	-0.0469**	(-3.27)
Proportion full cooperators	0.0653***	(4.72)	-0.000680	(-0.05)
Proportion free riders	0.0712***	(4.87)	0.0109	(0.87)
Observations	1789		1823	

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 24: T-Tests of differences in average behaviour for high and low inheritors

	LI E-U		LR E-U		HI E-U		HR E-U	
Fraction of endowment contributed	-0.0252	(-1.30)	-0.141***	(-6.15)	0.0886***	(4.51)	-0.0153	(-0.74)
Proportion full cooperators	0.00469	(0.29)	-0.0903***	(-3.93)	0.0572**	(3.03)	-0.0557***	(-2.76)
Proportion free riders	0.0263	(1.53)	0.0639**	(2.65)	0.0201	(1.21)	-0.0727***	(-3.87)
Observations	943		846		976		847	

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 25: T-tests of differences in average behaviour for high and low lottery recipients in equal and unequal groups

	Minimise-Equalise	Minimise-Equalise
Fraction of endowment contributed	-0.0318*	(-2.12)
Public Pot		-52.16 (-1.11)
Observations	1916	478

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 26: Testing for significant differences between minimise and equalise redistribution policies in redistribution groups

	MinS1-Min S2	EquS1-EqS2	MinS1-MinS2	EqS1-EqS2
Fraction of endowment contributed	0.0435**	0.0424**		
	(3.08)	(2.79)		
Public Pot			115.2**	70.86
			(2.86)	(1.52)
Observations	1916	1916	478	478

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 27: Testing for significant differences between stage one and stage two behaviour for the different redistribution policies

	Minimise-Equalise	Random-Inherited
Fraction of endowment contributed	0.0857***	(5.71)
Public Pot		243.7*** (5.31)
Observations	1916	478

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 28: Testing for significant differences between inheritance and random endowments in stage two and between stage one and two

	RandS1-RandS2	InhS1-InhS2	RandS1-RandS2	InhS1-InhS2
Fraction of endowment contributed	0.0218	0.0602***		
	(1.32)	(4.63)		
Public Pot			-12.73	179.5***
			(-0.26)	(4.70)
Observations	1722	2110	430	526

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 29: Testing for significant differences between inheritance and random endowments in redistribution groups

	Minimise-Equalise
Fraction of endowment contributed	0.00572 (0.38)
Observations	1888

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 30: Testing for significant differences between high and low endowment recipients in the redistribution phase

	LowS1-LowS2	HighS1-HighS2
Fraction of endowment contributed	0.0465** (3.04)	0.0400** (2.84)
Observations	1872	1904

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 31: Testing for significant differences between high and low endowment recipients stage one and stage two behaviour

	Lottery Minimise-Inherit	Minimise	Lottery Equalise-Inherit	Equalise
Fraction of endowment contributed	0.0691*** (3.42)	(3.42)	0.100*** (4.52)	(4.52)
Public Pot	56.86 (0.96)	(0.96)	425.7*** (6.27)	(6.27)
Observations	958		958	

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 32: Testing for significant differences between inheritance and random endowments in groups equalised in stage two by a redistribution rule

	LM S1-S2	IM S1-S2	LE S1-S2	IE S1-S2
Fraction of endowment contributed	0.0177 (0.77)	0.0632*** (3.63)	0.0256 (1.09)	0.0571** (2.94)
Public Pot	37.39 (0.61)	175.2** (3.30)	-59.70 (-0.83)	184.1*** (3.40)
Observations	830	1086	892	1024

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 33: Testing for significant differences between inheritance and random endowments in unequal groups with the two redistribution rules

	Lottery Low-Inherit	Low	Lottery High-Inherit	High
Fraction of endowment contributed	0.115*** (5.25)	(5.25)	0.0577** (2.81)	(2.81)
Observations	936		952	

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 34: Testing for significant differences between inheritance and random endowment recipients in unequal groups for high and low types in stage two

	LL S1-S2	LI S1-S2	HL S1-S2	HI S1-S2
Fraction of endowment contributed	-0.0392 (-1.89)	0.0466** (2.82)	0.00140 (0.07)	0.104*** (6.32)
Observations	1248	1456	1264	1504

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 35: Testing for significant differences between stage one and stage behaviour for inheritance and random endowment recipients in unequal groups in stage two of the experiment

	Low Minimise-Low Equalise	High Minimise-High Equalise
Fraction of endowment contributed	-0.0428 (-1.94)	-0.00988 (-0.48)
Observations	936	952

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 36: Testing for significant differences between minimise and equalise interventions in unequal groups by endowment amount

	LM S1-S2	LE S1-S2	HM S1-S2	HE S1-S2
Fraction of endowment contributed	0.0352 (1.69)	0.0580** (2.60)	0.0539** (2.82)	0.0263 (1.27)
Observations	944	928	944	960

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 37: Testing for significant differences between stage one and stage two behaviour of recipients of high and low endowments subject to the two redistribution rules

10.2 Regression controls

The full controls used could not fit onto a page when included with the treatment variables. Consequently, a regression with all the controls used is included on the following page for each regression model that is estimated. The dummies for group fixed effects remain suppressed for this reason.

	Fraction	Group Contribution	Average fraction
Race			
2. Asian/Indian	0.0485* (2.05)		0.0325 (0.66)
3. White	0.136*** (5.56)		0.0229 (0.45)
4. Coloured	0.0363 (1.50)		0.126* (2.49)
5. Mixed Race	0.201** (2.68)		0.138 (1.12)
6. Prefer not to answer	-0.0441 (-0.65)		-0.134 (-0.91)
Language			
2. Cantonese	0.0746 (0.92)		-0.0547 (-0.30)
3. Creole	-0.147* (-2.08)		0.169 (0.90)
4. English	-0.0121 (-0.40)		0.0365 (0.43)
7. Gujarati	0.278*** (3.31)		
10. Lingala	0.0809 (0.70)		
12. Ndbele	-0.121* (-2.20)		0.0362 (0.28)
14. Oshiwambo	0.0852 (1.05)		0.236 (1.59)
16. Portuguese	-0.211 (-1.95)		-0.172 (-0.91)
17. Sepedi	0.0689 (1.45)		-0.0548 (-0.48)
20. Shona	0.0231 (0.52)		0.0458 (0.43)
21. Sotho	0.0133 (0.32)		0.116 (1.13)
22. Swahili	0.124* (2.06)		-0.0686 (-0.47)
23. Swati	-0.0387 (-0.84)		0.00172 (0.01)
25. Tsonga	0.171*** (3.30)		0.0399 (0.34)
26. Tswana	0.0171 (0.40)		0.139 (1.29)
27. Venda	-0.0234 (-0.53)		0.0810 (0.76)
28. Xhosa	-0.0188 (-0.50)		0.0907 (0.96)
29. Zulu	-0.0452 (-1.18)		0.0310 (0.31)
Faculty			
2. Engineering and Built Environment	-0.00440 (-0.24)		0.0210 (0.54)
3. Health Sciences	0.0376 (1.71)		0.00472 (0.10)
4. Humanities	-0.0167 (-0.96)		0.0181 (0.49)
5. Law	-0.0185 (-0.35)		-0.0368 (-0.38)
6. Sciences	0.0544** (2.78)		0.0865* (2.05)
Male	0.0106 (0.94)		-0.00606 (-0.25)
Prefer not to disclose gender	0.268*** (5.93)		0.250* (2.30)
Age in years	0.00701* (2.53)		0.00420 (0.69)
Years of university study	-0.00660 (-1.24)		-0.0113 (-0.95)
Exposure to game theory	-0.00434 (-0.23)		-0.0362 (-0.94)
Nationality	0		0
1. South African	0.0114 (0.51)		-0.0566 (-1.07)
Financial aid recipient	-0.0336** (-3.06)		-0.0529* (-2.19)
Period of game	-0.0106*** (-4.88)	-19.48*** (-3.42)	
Lagged ratio of group contribution to pot size	0.564*** (17.69)	1424.3*** (15.99)	0.338*** (4.19)
Average stage one contribution			0.695*** (13.55)
Constant	0.0891 (1.22)	444.7*** (6.34)	-0.0670 (-0.41)
Observations	3396	476	236
R ²	0.274	0.611	0.750

Table 38: Regression including all the controls used for estimating the determinants of the average fraction contributed to the public pool

10.3 Z-tree sample screens

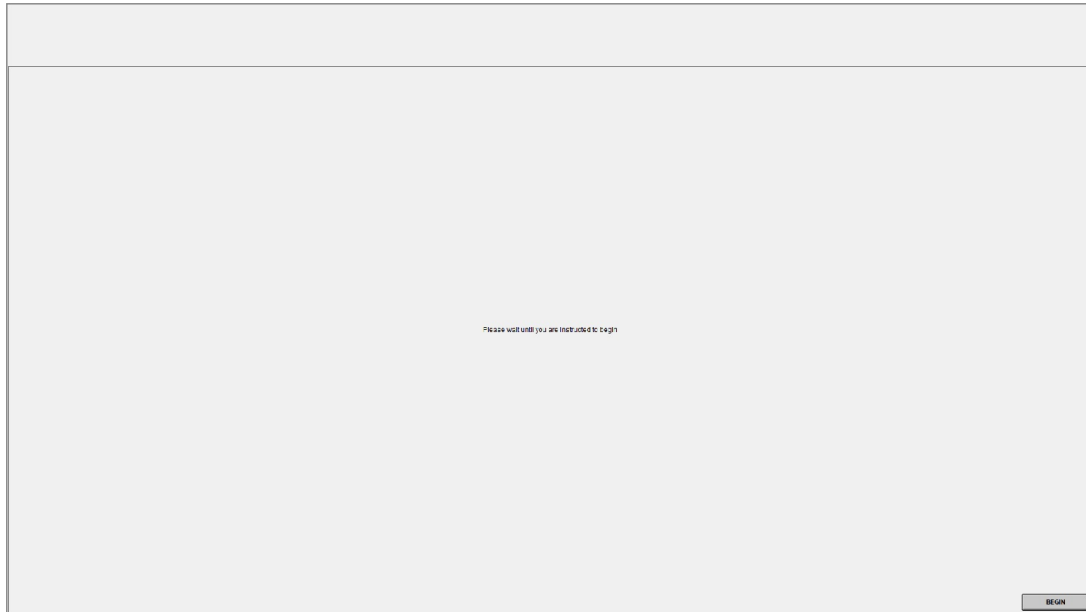


Figure 14: Starting screen in the z-tree programme

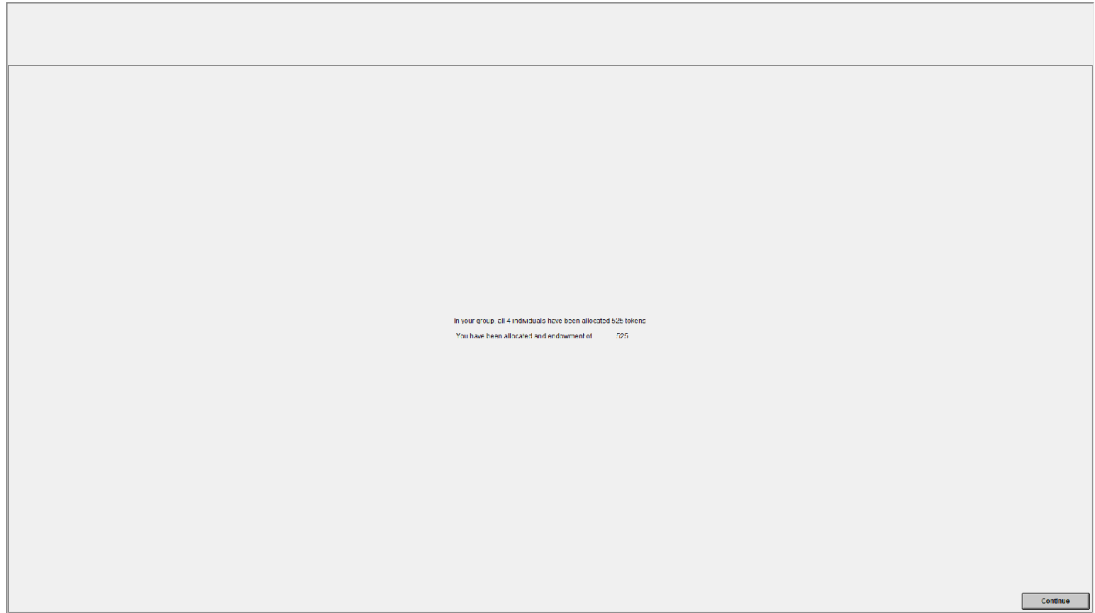


Figure 15: Endowment information screen in the z-tree programme

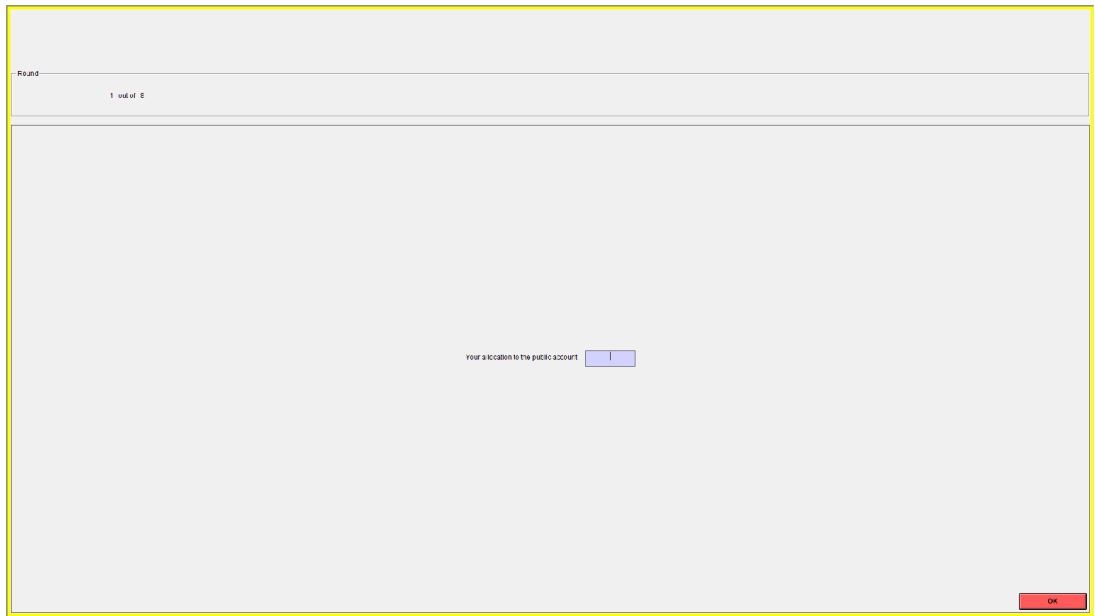


Figure 16: Decision screen in the z-tree programme

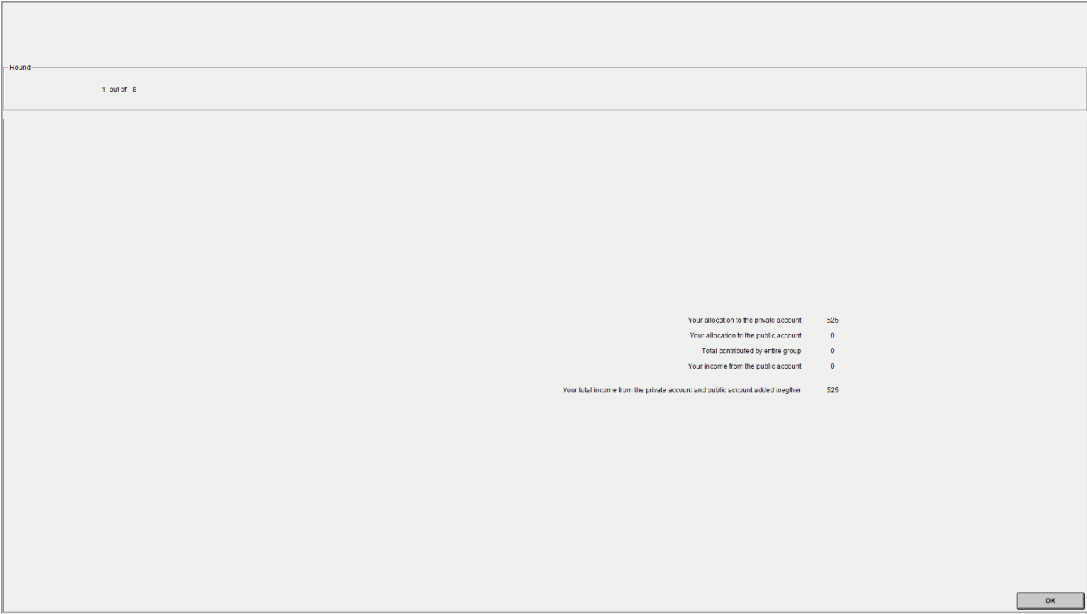


Figure 17: Payout information screen in the z-tree programme

10.4 Communication Material

Recruitment Email

Dear Students

You are invited to participate in a decision-making task that will be run in mid-August. In the decision task, you will be given the opportunity to earn money (as much as R250 for just an hour and a half of your time) based on the decisions you make. In the task, you will be given an initial amount of money and asked to make some decisions with that money. The decisions you make may increase the final amount you earn.

In order to participate in that task, the research team requires some basic contact details from you in order to add you to our database. Once added to our database, we will contact you for attitudinal and demographic information related to the research and to give you a chance to participate in an activity in person. By clicking on the link below, you are consenting to participate in this study, and to provide the research team with this data. All information provided will be kept confidential, and you will not be identified by name in any of the research that is published. However, the information you provide will be used as part of the research and to inform the design of the decision task.

The questionnaire will take approximately 5 minutes to complete. By completing this questionnaire, you are signalling your desire to participate in a decision-making task that will be run in the coming months. However, should you change your mind between now and when the task is actually run, you are under no obligation to participate. You are free to withdraw from the study at any point. Should you withdraw from the study, your data will be deleted from the database.

This research has been approved by the Commerce Faculty Ethics in Research Committee. Your participation in this research is voluntary. You can choose to withdraw from the research at any time.

Should you have any questions regarding the research, please feel free to contact the researcher, Brynde Kreft (bryndefj@gmail.com) at any time. The researcher is committed to being available for all questions, comments and concerns.

If you are willing to participate in the study, please click on the link below and proceed to the questionnaire. [Please click here to proceed to the recruitment questionnaire](#) or copy the following link into your web browser address bar: <https://goo.gl/forms/soRIRUcunQntlqm72>.

Thank you for your time

Recruitment Questionnaire



You are being invited to participate in a decision-making task that will be run in the coming months. In the decision task, you will be given the opportunity to earn money based on the decisions you make. In order to participate in that task, the research team requires some basic demographic and attitudinal data from you. By clicking on the link below, you are consenting to participate in this study, and to provide the research team with this data. All information provided will be kept confidential, and you will not be identified by name in any of the research that is published. However, the information you provide will be used as part of the research and to inform the design of the decision task.

The questionnaire will take approximately 5 minutes to complete. By completing this questionnaire, you are signalling your desire to participate in a decision-making task that will be run in the coming months. However, should you change your mind between now and when the task is actually run, you are under no obligation to participate. You are free to withdraw from the study at any point. Should you withdraw from the study, your data will be deleted from the database.

This research has been approved by the Commerce Faculty Ethics in Research Committee. Your participation in this research is voluntary. You can choose to withdraw from the research at any time.

Should you have any questions regarding the research, please feel free to contact the researcher, Brynde Kreft (bryndefj@gmail.com) at any time. The researcher is committed to being available for all questions, comments and concerns.

If you are willing to participate in the study, please click on the link below and proceed to the questionnaire.

Recruitment Questionnaire

1. What is your name and surname?

This is for purposes of administration and will not be shared with anyone, nor used in the final research. Your name will be deleted from our database after you have attended your selected activity session.

2. What is your student number?
3. What is your email address?

This is in order to schedule a session for you

4. What is your cell phone number?

This is in order to remind you of your session details and times

Thank you for your time. The researchers will contact you using the details provided with further instructions relating to this study.



You are invited to participate the decision-making task component of this study. Before selecting a time at which you will arrive at the computer laboratory on campus to complete the task, the research team requires some basic demographic and attitudinal data from you. Please answer the following questions truthfully and as accurately as possible because the information you provide will be used as part of the research and to inform the design of the decision task.

By clicking on the link below, you are consenting to participate in this study, and to provide the research team with this data. All information provided will be kept confidential, and you will not be identified by name in any of the research that is published.

The questionnaire will take approximately 5 minutes to complete. By completing this questionnaire, you are signalling your desire to participate in a decision-making task at a time which you will select at the end of the questionnaire. However, should you change your mind between now and when the task is actually run, you are under no obligation to participate. You are free to withdraw from the study at any point. Should you withdraw from the study, your data will be deleted from the database. Your participation in this research is voluntary. You can choose to withdraw from the research at any time.

This research has been approved by the Commerce Faculty Ethics in Research Committee.

Should you have any questions regarding the research, please feel free to contact the researcher, Brynde Kreft (bryndefj@gmail.com) at any time. The researcher is committed to being available for all questions, comments and concerns.

If you are willing to attend the task in person, please click on the link below and proceed to the questionnaire.

1. How many years have you been studying at a tertiary institution, including this year?

- 1
- 2
- 3
- 4

- 5
- 6
- 7
- 8
- 9
- 10

2. What was the year that you first registered to study at a tertiary institution?

3. What faculty are you in?

Check the appropriate block

- Commerce
- Humanities
- Science
- Engineering and the built environment
- Health Sciences
- Law

4. Have you ever registered for ECO2007S? (Competition and Cooperation/Game theory)

- Yes
- No

5. What is your age in years (today)?

6. What is your gender?

- Male
- Female
- Other, please specify _____
- Prefer not to answer

7. What is your race?

- Asian
- Black
- Coloured
- Indian
- White
- Other, please specify _____
- Prefer not to answer

8. What is your home language?

- Afrikaans
- English
- Ndebele
- Tsonga
- Tswana
- Sotho
- Shona
- Swati

- Venda
- Xhosa
- Zulu
- Other, please specify_____

9. What is your nationality?

- South Africa
- Namibia
- Zimbabwe
- Botswana
- Mozambique
- Other, please specify_____
- Prefer not to answer

10. Do you receive financial aid (not a scholarship) from NSFAS?

- Yes
- No
- Prefer not to answer

11. Do you receive financial aid (not a scholarship) from UCT?

- Yes
- No
- Prefer not to answer

12. Do you receive financial aid (not a scholarship) from a third party? If so, who?

- Yes, _____
- No
- Prefer not to answer

13. Have you ever applied for financial aid? (Not a scholarship)

- Yes
- No
- Prefer not to answer

14. Generally speaking, would you say most people can be trusted?

- Yes
- No

15. Please imagine a ten-step ladder where the poorest people in South Africa stand on the bottom step (the first step) and the richest people in South Africa stand on the highest step (the tenth step).

On which step did your grandparents stand over the course of their lifetime?

- 1
- 2
- 3

- 4
- 5
- 6
- 7
- 8
- 9
- 10
- Prefer not to answer

16. Please imagine a ten-step ladder where the poorest people in South Africa stand on the bottom step (the first step) and the richest people in South Africa stand on the highest step (the tenth step).

On which step did (or do?) your parents stand over the course of their lifetime?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- Prefer not to answer

17. Please imagine a ten-step ladder where the poorest people in South Africa stand on the bottom (the first step) and the richest people in South Africa stand on the highest step (the tenth step).

On which step do you expect your lifetime earnings will stand?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- Prefer not to answer

18. Do you expect to inherit anything from your parent(s)?

- Yes
- No

Prefer not to answer

19. Have you inherited anything from your parent(s) in the past?

- Yes
- No
- Prefer not to answer

20. Do you expect to inherit anything from your grandparents?

- Yes
- No
- Prefer not to answer

21. Have you inherited anything from your grandparent(s) in the past?

- Yes
- No
- Prefer not to answer

22. Compared to when your parents were the age you are now, how well off are you?

- Much better off
- Better off
- About the same
- Worse off
- Much worse off
- Prefer not to say

23. Compared to when your grandparents were the age you are now, how well off are you?

- Much better off
- Better off
- About the same
- Worse off
- Much worse off
- Prefer not to say

24. Which of the following groups do you think have the greatest responsibility for helping the poor?

- Churches
- Private charities
- Government
- Families and relatives of those individuals
- The poor themselves
- Other

25. In your opinion, how much is the government doing to ensure that people of all races have equal opportunities for jobs, housing, and education?

- Nothing

- A little
- Quite a bit
- A lot

26. How much should the government be doing to ensure that people of all races have equal opportunities for jobs, housing, and education?

- Nothing
- A little
- Quite a bit
- A lot

27. When is it morally justified to not pay for the services you receive from government?

- Always justified
- Sometimes justified
- Rarely justified
- Never justified

28. When is it morally wrong to not pay the taxes you owe on your income?

- Always justified
- Sometimes justified
- Rarely justified
- Never justified

Below are a series of statements. For each statement, tick the box that best represents whether you agree or disagree with the statement.

29. The current South African government is addressing inequality between the rich and the poor effectively?

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

30. The current South African government is effectively distributing welfare payments to those who are entitled to them.

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

31. The South African government should redistribute wealth from the rich to the poor

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

32. There should be heavy taxes on the rich generally

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

33. There should be heavy taxes on the rich in South Africa

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

34. The distribution of money and wealth in South Africa is fair

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

35. The tax authority in South Africa always has the right to make people pay taxes.

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

36. The fact that some people in South Africa are poor and others are rich is a problem that needs to be fixed.

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

37. Citizens must pay their taxes to the government in order for South Africa to develop.

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

38. The government can find enough resources for development in South Africa from other sources without having to tax the people.

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree

For the following questions, you need to decide whether you agree or disagree with the statement. Please select the appropriate box.

1. You believe that your success depends on ability rather than luck

agree disagree

2. You dislike taking responsibility for making decisions

agree disagree

3. You make decisions and move on

agree disagree

4. You believe that unfortunate events occur because of bad luck

agree disagree

5. You like to take responsibility for making decisions

agree disagree

6. You tend to analyse situations too much and therefore miss opportunities

agree disagree

Thank you for your time. Please click the following link to select a session to attend in person and partake in the decision making task.

Lottery Equalise experimental session script

We are now going to complete a series of decision tasks. These tasks may be quite different to anything you have done before, so please listen carefully. In these decision tasks, you will have the opportunity to earn money. The amount you earn will depend on the choices you make, as well as the choices of others. You do not need any special skills to complete the tasks, and I will explain each task to you as we proceed.

In a few moments, each of you will randomly select a player ID from the bag I am holding. This number is your player ID, and you must be seated at the computer which has the same number on it. This is our only way to record how much to pay you, so it is critical that you are seated at the correct computer. At the end of the session today, when we finalise the tasks, you must produce your Player ID in order to receive your receipt. You will then take your receipt along with your student ID to the cashiers office on middle campus and they will pay you in cash. You must take your student card with you, otherwise you will not be able to claim your payment. Also, do not alter the receipt in any way. The cashiers office will not pay out money for any receipt that has been altered in any way. If you have any questions at any stage please raise your hand silently and wait for me to come to your computer to ask your question.

From now on please do not look at anyone else's computer screen or communicate with anyone other than me. Please put cell phones off and into your bags. If you violate these instructions, you will be asked to leave this task.

We will now begin the first task.

Participant Instructions for Decision Making Exercise 1 (PG)

In this task, you will have the chance to earn money based on the decisions that you and the other players in your group make. There are **four** individuals in each group and they are individuals participating in this session too. The identity of the others in your group will never be revealed to you. Any decision you make will never be revealed to anyone. Nobody will know what you have decided to do and your name is never linked to any of your decisions in this activity.

- In this exercise, you will be given money and asked to make some decisions with that money.
- I will now explain how the amount of money you start with was decided.
- In this exercise, you have each been randomly allocated to receive either a high or a low amount of money. This means that not all of you will receive the same amount of money. Out of everyone participating in the research, roughly half of you will receive a high starting amount and roughly half will receive a low starting amount. High allocations will be 700 tokens. Low allocations will be 350 tokens. In other words, if you were randomly allocated a low starting amount, you will begin the task with 350 tokens. If you were randomly allocated a high starting amount you will begin the task with 700 tokens.
- You may have a different starting amount than other members of your group.

- In today's session, all groups have been randomly allocated to have two members with a high starting amount and two members with a low starting amount. You will be informed on your computer screens of the starting token amounts of the members of your entire group. In other words, you will be informed of the income distribution of your group. However, you will not be able to identify who those group members are.
- Your tokens will be exchanged for Rands at the end of the session. Tokens will be exchanged for Rands at an exchange rate. I do not want you to worry about the exchange rate for now. During the task, just make your decision based on how many tokens you have. More tokens means more money.

With the tokens you have been randomly allocated, you will have to make a decision of how to allocate the tokens.

Now I will explain the decision you will be asked to make.

- You must decide how many of your tokens you want to put into a Private Account, and how many you want to allocate to a Public Account.
- Any tokens you decide to put into your private account, you will keep for yourself.
- You can also earn money by allocating tokens to the public account. The amount of money you earn by allocating tokens to the public account will depend on the decisions that you and the others in your group make about how many tokens to allocate to the public account.
- Once everyone has made their decision about how many tokens to contribute to the public account, the computer software will add up the total amount of tokens in the public account. This total number of tokens will be multiplied by 2 and divided equally amongst everyone in the group, regardless of how many tokens they contributed to the public account.
- So for example, if there are 20 tokens in the public account, this will become 40 tokens, and each person in the group will receive 10 tokens from the public account. Your final earnings for that round will be what you receive from the public account added to whatever you put into your private account.
- You will make this decision 8 times with the same group of people. For each round you will be given a new token allocation of the same amount as your starting allocation to assign as you wish. If you were randomly allocated to start the task with 350 tokens, you will receive 350 tokens every time we start a new round in this task. Similarly, if you were randomly allocated to start the task with 700 tokens, you will receive 700 tokens every time we start a new round.
- Each round your earnings will be the sum of what receive from the public and private accounts. Your earnings will be saved until the end of the session when you will be informed of what you earned in total. Your final earnings will be the sum of all of the separate round earnings. The final earnings amount will then be converted from tokens into Rands at an exchange rate and will be paid to you at the cashiers' office on middle campus after the experiment.

- For each round you will be asked to enter on your computer monitor how many of your allocated tokens you wish to place in the public account. For each round you must enter a number to represent how much you are putting into the public account. You can put any amount in the public account, from all of your tokens to none of your tokens, as long as it is in multiples of 1 token. Decimal amounts will not be accepted by the software. Whatever is not put into the public account will automatically be put into your private account, and that is yours to keep.
- So, if start with 100 tokens and you put 50 tokens in the public account, how much goes into your private account?.....50 tokens
- If you start with 100 tokens and put 20 tokens into the public account, how much goes into the private account?.....80 tokens
- And if you start with 100 tokens and put 100 tokens into the public account, how much goes into the private account?.....0 tokens.

- This task will be completed on a computer. You should now all see the [waiting screen]. Raise your hand if you are not seeing this screen.
- In a moment, when we begin the task, once everyone has completed their decision for round one you will all proceed to the next screen together. This screen will inform you how much was contributed to the public account in total by your group of four, and how much you earned individually from the public account.
- Each member of your group will earn the same amount from the public account, regardless of what they put into the public account because it is split four ways. You will not be able to see which member of your group contributed what amount to the public account and you will not be able to see how much others earned from their private account.
- After everyone is informed of their earnings you will all proceed to the next round at the same time. Each of the rounds will follow the same procedure.
- Your computer will keep track of how much you earn in each round and add this together to calculate your final earnings.
- This exercise will be repeated 8 times. Each time we begin a new round, you have a new allocation of tokens with which you should make your decision.
- Once all 8 rounds have been completed, the tokens earned over all 8 rounds will be added together to calculate your total earnings from the exercise. You will be informed of your total earnings with a private message on your computer screen at the end of the entire session.
- We will now do an example or two to make sure everyone understands.
- Suppose that everyone in the group has an allocation of 100 tokens and decides to allocate their 100 tokens to their private account.

- How much will there be available for the public account? (Zero.)
 - How much will you each earn? 100 tokens – you will keep the 100 tokens that was put in your private account.
- Now suppose instead that everyone in the group has 100 tokens and decides to put all of the 100 tokens into the public account.
 - How much do you have in your private account? Zero.
 - How much is in the public account? $100 \times 4 = 400$ tokens.
- This amount will be multiplied by 2 to give 800 tokens, and will be divided equally amongst everyone in the group. So you would each receive 200 tokens from the public account.

Now let's discuss examples which correspond to your endowments. For these examples we will assume that the group we are discussing has two high allocation individuals and two low allocation individuals.

1. If everyone allocated all of their starting amount to their private account, there would be 0 tokens in the public account. High allocation individuals would have 700 tokens in their private accounts and Low allocation individuals would have 350 tokens in their private accounts.
2. If everyone allocated all of their starting amount to their public account, there would be 2100 tokens in the public account. All individuals would then receive 1050 tokens from the public account and none from the private account.
3. If everyone allocated half of their starting amount to their public account, there would be 1050 tokens in the public account. High allocation individuals would have 350 tokens in their private accounts and low allocation individuals would have 175 tokens in their private accounts. Each individual would then receive 262 tokens from the public account. So, high allocation individuals would earn 612 tokens in that round and low allocation individuals would earn 437 tokens in that round.

Is this clear?

Please remember that you have the potential to earn real money, so you should treat each decision seriously, since it will affect how much you and the others in your group earn as payment.

If you have any questions please raise your hand now.

If they have questions, answer them individually

We will now begin.

Once you have completed your decision for this round please raise your hand.

Once all hands are raised: Please all select the “Continue” option on your screen to view your earnings from this round. *Give some time for this, then,* Please all select “Continue”

To proceed to the following round.

So go through 8 rounds. At the end of 8 rounds:

Thank you. We have now completed that task.

Participant Instructions for Decision Making Exercise 2 (PG)

In the task you have just completed, tokens were unequally allocated between group members based on randomness, in other words, luck. Those who were randomly selected to receive a low allocation received 350 tokens, and those who randomly selected to receive a high allocation received 700 tokens.

In this second task, we will address this inequality through an inequality tax. The tax will be levied on those who received 700 tokens in the previous task. The tax will be 175 tokens. In other words, those who previously started with 700 tokens will have 175 tokens taken away, and will now start with 525 tokens. The 175 tokens tax revenue will be given to those who previously began with 350 tokens. Thus, those who previously started with 350 tokens will also begin this task with 525 tokens.

In this task you will again be deciding how much to allocate to public and private accounts. This task is identical to the first task, except that the number of tokens that each group member receives is different because of the tax. This time, everyone will receive 525 tokens.

In this task, you must decide how many of your tokens you want to allocate to a PRIVATE ACCOUNT and how many you want to allocate to a PUBLIC ACCOUNT.

You will keep any tokens that you decide to allocate to your private account.

You can also earn tokens by allocating tokens to the public account. The number of tokens that you earn from the public account will depend on the decisions that you and the others in your group make about how many tokens to allocate to the public account.

In a moment, you will have the opportunity to enter on the computer how many of your tokens you want to put into the public account. You can put any number of tokens – from none of them to all of them - into the public account, as long as it is in multiples of 1 token. Decimal amounts will not be accepted by the software. Whatever you do not put into the public account is automatically put into your private account, and that is yours to keep.

- To illustrate the way it works, let us assume you started with 500 tokens
- So, if you put 250 tokens into the public account, you will have 250 tokens in your private account.
- If you put 500 tokens into the public account, you will have 0 tokens in your private account.
- If you put 400 tokens into the public account, you will have 100 tokens in your private account.

Once everyone has made their decision about how many tokens they want to contribute to the public account, the computer will add up the total number of tokens in the public account. This number will then be multiplied by 2 and divided equally amongst the four people in the group, regardless of how many tokens each person has contributed to the public account.

For example, if there are 140 tokens in the public account, this will be multiplied by 2 and become 280 tokens. Each person in the group will, therefore, receive 70 tokens from the public account.

Your earnings in the task will be what you receive from the public account, added to whatever you put into your private account.

As before, the task that has just been explained to you will be repeated 8 times.

At the start of each new round, you will be given a new endowment of tokens with which you should make your decision. The number of tokens you receive depends directly on what you received in the first task.

If you originally received 700 tokens based on your random allocation to receive a high amount, then in this task, you will pay a tax of 175 tokens in each round. Therefore you will start with 525 tokens. That is 25% less than you began with in the previous task.

If you originally received 350 tokens based on your random allocation to receive a low amount, then in this task, you will receive 525 tokens, an increase of 175 tokens. This increase was raised from the tax on high endowment individuals. This is a 50% increase on what you began with in the first task.

At the end of each round, the computer will tell you how many tokens are in the public account, and how much you each earn from the public account for that round.

In each of the 8 rounds, the computer will keep track of how many tokens you earn - from both the public account and your private account. Once all 8 rounds have been completed, the tokens earned in all 8 rounds will be added together to calculate your total tokens for the exercise. You will be informed of your total earnings the end of today's session and tokens will then be converted into rands at an exchange rate. For now, just remember that more tokens will represent more rands.

If you have any questions, please raise your hand now and I will come and answer them individually.

We will now begin the task. Remember that there are 8 rounds in this task and you will receive a new endowment of tokens at the start of each round.

Please click next to begin the task

Once you have completed your decision for this round please raise your hand.

Once all hands are raised: Please all select the “Next” option on your screen to view your earnings from this round. *Give some time for this, then,* Please all select “Next” To proceed to the following round.

So go through 8 rounds. At the end of 8 rounds:

Thank you. We have now completed that task.

Please click next and complete the brief questionnaire on your screen. Once you are finished, select “next” and raise your hand. Your total earnings from the entire session will now be displayed. The number of tokens will be converted into a rand amount using the conversion rate: 280 tokens = R3.

Please sit quietly at your computers while I come around and complete your invoice page. Once you have your invoice page completed by me you may leave quietly. Please do not talk to anyone while you are still in this room.

Inherit Minimise experimental session script

We are now going to complete a series of decision tasks. These tasks may be quite different to anything you have done before, so please listen carefully. In these decision tasks, you will have the opportunity to earn money. The amount you earn will depend on the choices you make, as well as the choices of others. You do not need any special skills to complete the tasks, and I will explain each task to you as we proceed.

In a few moments, each of you will receive a player ID from me. This number is your player ID, and you must be seated at the computer which has the same number on it. This is our only way to record how much to pay you, so it is critical that you are seated at the correct computer. At the end of the session today, when we finalise the tasks, you must produce your Player ID in order to receive your receipt. You will then take your receipt along with your student ID to the cashiers office on middle campus and they will pay you in cash. You must take your student card with you, otherwise you will not be able to claim your payment. Also, do not alter the receipt in any way. The cashiers office will not pay out money for any receipt that has been altered in any way. If you have any questions at any stage please raise your hand silently and wait for me to come to your computer to ask your question.

From now on please do not look at anyone else's computer screen or communicate with anyone other than me. Please put cell phones off and into your bags. If you violate these instructions, you will be asked to leave this task.

We will now begin the first task.

Participant Instructions for Decision Making Exercise 1 (PG)

In this task, you will have the chance to earn money based on the decisions that you and the other players in your group make. There are **four** individuals in each group and they are individuals participating in this session too. The identity of the others in your group will never be revealed to you. Any decision you make will never be revealed to anyone. Nobody will know what you have decided to do and your name is never linked to any of your decisions in this activity.

- In this exercise, you have each been given an amount of money based on your answers to the recruitment survey you completed. This means that not all of you will receive the same amount of money. You may have a different starting amount than other members of your group.

I will now explain how the amount of money you start with was decided.

When signing-up for this experiment, you completed an online questionnaire. In that questionnaire, you were asked the following question:

Please imagine a ten-step ladder where the poorest people in South Africa stand on the bottom step (the first step) and the richest people in South Africa stand on the highest step (the tenth step). On which step did (or do?) your grandparents stand over their lifetime?

Based on the answers provided by everyone who signed up to participate in this task, we calculated the average answer to this question. In other words, we know where the average

participant in this decision task said their grandparents placed on the 10-step ladder. We use this average to decide who in your group will receive 350 tokens and who will receive 700 tokens.

- If your grandparents were placed below the average on the 10-step ladder, you will receive 350 tokens. If your grandparents were placed above the average on the 10-step ladder, you will receive 700 tokens. In other words, if you reported your grandparents to have been relatively lower in the income distribution relative to others participating in these decision tasks, you will receive the lower endowment of 350 tokens. If you reported your grandparents to have been relatively higher in the income distribution relative to others participating in these decision tasks, you will receive the lower endowment of 700 tokens.
- In other words, your starting allocation in today's task is inherited from your grandparents' position in the income distribution.
-
- In today's session, all groups comprise of two high inheritance individuals (who each receive 700 tokens) and two low inheritance individuals, who each receive 350 tokens). You will be informed on your computer screens of the starting token amounts of the members of your entire group. In other words, you will be informed of the income distribution of your group. You will not be able to identify who those group members are.
- Your tokens will be exchanged for Rands at the end of the session. Tokens will be exchanged for Rands at an exchange rate. I do not want you to worry about the exchange rate for now. During the task, just make your decision based on how many tokens you have. More tokens means more money.

With the tokens you have received based on your grandparents income status, you will have to make a decision of how to allocate the tokens.

Now I will explain the decision you will be asked to make.

- You must decide how many of your tokens you want to put into a Private Account, and how many you want to allocate to a Public Account.
- Any tokens you decide to put into your private account, you will keep for yourself.
- You can also earn money by allocating tokens to the public account. The amount of money you earn by allocating tokens to the public account will depend on the decisions that you and the others in your group make about how many tokens to allocate to the public account.
- Once everyone has made their decision about how many tokens to contribute to the public account, the computer software will add up the total amount of tokens in the public account. This total number of tokens will be multiplied by 2 and divided equally amongst everyone in the group, regardless of how many tokens they contributed to the public account.

- So for example, if there are 20 tokens in the public account, this will become 40 tokens, and each person in the group will receive 10 tokens from the public account. Your final earnings for that round will be what you receive from the public account added to whatever you put into your private account.
- You will make this decision 8 times with the same group of people. For each round you will be given a new token allocation of the same amount as your starting allocation to assign as you wish. If you start the task with 350 tokens, based on your grandparents position in the income distribution, you will receive 350 tokens every time we start a new round in this task. Similarly, if you start the task with 700 tokens, based on your grandparents position in the income distribution, you will receive 700 tokens every time we start a new round.
- Each round your earnings will be the sum of what receive from the public and private accounts. Your earnings will be saved until the end of the session when you will be informed of what you earned in total. Your final earnings will be the sum of all of the separate round earnings. The final earnings amount will then be converted from tokens into Rands at an exchange rate and will be paid to you at the cashiers' office on middle campus after the experiment.
- For each round you will be asked to enter on your computer monitor how many of your allocated tokens you wish to place in the public account. For each round you must enter a number to represent how much you are putting into the public account. You can put any amount in the public account, from all of your tokens to none of your tokens, as long as it is in multiples of 1 token. Decimal amounts will not be accepted by the software. Whatever is not put into the public account will automatically be put into your private account, and that is yours to keep.
- So, if start with 100 tokens and you put 50 tokens in the public account, how much goes into your private account?.....50 tokens
- If you start with 100 tokens and put 20 tokens into the public account, how much goes into the private account?.....80 tokens
- And if you start with 100 tokens and put 100 tokens into the public account, how much goes into the private account?.....0 tokens.
- This task will be completed on a computer. You should now all see the [waiting screen]. Raise your hand if you are not seeing this screen.
- In a moment, when we begin the task, once everyone has completed their decision for round one you will all proceed to the next screen together. This screen will inform you how much was contributed to the public account in total by your group of four, and how much you earned individually from the public account.
- Each member of your group will earn the same amount from the public account, regardless of what they put into the public account because it is split four ways. You will not be able to see which member of your group contributed what amount to the public account and you will not be able to see how much others earned from their private account.

- After everyone is informed of their earnings you will all proceed to the next round at the same time. Each of the rounds will follow the same procedure.
- Your computer will keep track of how much you earn in each round and add this together to calculate your final earnings.
- This exercise will be repeated 8 times. Each time we begin a new round, you have a new allocation of tokens with which you should make your decision.
- Once all 8 rounds have been completed, the tokens earned over all 8 rounds will be added together to calculate your total earnings from the exercise. You will be informed of your total earnings with a private message on your computer screen at the end of the entire session.
- We will now do an example or two to make sure everyone understands.
- Suppose that everyone in the group has an allocation of 100 tokens and decides to allocate their 100 tokens to their private account.
 - How much will there be available for the public account? (Zero.)
 - How much will you each earn? 100 tokens – you will keep the 100 tokens that was put in your private account.
- Now suppose instead that everyone in the group has 100 tokens and decides to put all of the 100 tokens into the public account.
 - How much do you have in your private account? Zero.
 - How much is in the public account? $100 \times 4 = 400$ tokens.
- This amount will be multiplied by 2 to give 800 tokens, and will be divided equally amongst everyone in the group. So you would each receive 200 tokens from the public account.

Now let's discuss examples which correspond to your endowments. For these examples we will assume that the group we are discussing has two high inheritance individuals and two low inheritance individuals.

1. If everyone allocated all of their starting amount to their private account, there would be 0 tokens in the public account. High inheritance individuals would have 700 tokens in their private accounts and Low inheritance individuals would have 350 tokens in their private accounts.
2. If everyone allocated all of their starting amount to their public account, there would be 2100 tokens in the public account. All individuals would then receive 1050 tokens from the public account and none from the private account
3. If everyone allocated half of their starting amount to their public account, there would be 1050 tokens in the public account. High inheritance individuals would have 350 tokens in their private accounts and low inheritance individuals would have 175 tokens in their private accounts. Each individual would then receive 262 tokens from the public

account. So, high inheritance individuals would earn 612 tokens in that round and low inheritance individuals would earn 437 tokens in that round.

Is this clear?

Please remember that you have the potential to earn real money, so you should treat each decision seriously, since it will affect how much you and the others in your group earn as payment.

If you have any questions please raise your hand now.

If they have questions, answer them individually

We will now begin.

Once you have completed your decision for this round please raise your hand.

Once all hands are raised: Please all select the “Continue” option on your screen to view your earnings from this round. *Give some time for this, then,* Please all select “Continue” To proceed to the following round.

So go through 8 rounds. At the end of 8 rounds:

Thank you. We have now completed that task.

Participant Instructions for Decision Making Exercise 2 (PG)

In the task you have just completed, tokens were unequally allocated between group members based on where they reported their grandparents’ position in the income distribution. Those who reported their grandparents as being relatively low in the income distribution received 350 tokens, and those who reported their grandparents as being relatively high in the income distribution received 700 tokens.

In this second task, we will address this inequality through an inequality tax. The tax will be levied on those who received 700 tokens in the previous task. The tax will be 100 tokens. In other words, those who previously started with 700 tokens will have 100 tokens taken away, and will now start with 600 tokens. The 100 tokens tax revenue will be given to those who previously began with 350 tokens. Thus, those who previously started with 350 tokens will begin this task with 450 tokens.

In this task you will again be deciding how much to allocate to public and private accounts. This task is identical to the first task, except that the number of tokens that each group member receives is different because of the tax. This time, two people in the group will receive 600 tokens and two people in the group will receive 450 tokens.

In this task, you must decide how many of your tokens you want to allocate to a PRIVATE ACCOUNT and how many you want to allocate to a PUBLIC ACCOUNT.

You will keep any tokens that you decide to allocate to your private account.

You can also earn tokens by allocating tokens to the public account. The number of tokens that you earn from the public account will depend on the decisions that you and the others in your group make about how many tokens to allocate to the public account.

In a moment, you will have the opportunity to enter on the computer how many of your tokens you want to put into the public account. You can put any number of tokens – from none of them to all of them - into the public account, as long as it is in multiples of 1 token. Decimal amounts will not be accepted by the software. Whatever you do not put into the public account is automatically put into your private account, and that is yours to keep.

- To illustrate the way it works, let us assume you started with 500 tokens
- So, if you put 250 tokens into the public account, you will have 250 tokens in your private account.
- If you put 500 tokens into the public account, you will have 0 tokens in your private account.
- If you put 400 tokens into the public account, you will have 100 tokens in your private account.

Once everyone has made their decision about how many tokens they want to contribute to the public account, the computer will add up the total number of tokens in the public account. This number will then be multiplied by 2 and divided equally amongst the four people in the group, regardless of how many tokens each person has contributed to the public account.

For example, if there are 140 tokens in the public account, this will be multiplied by 2 and become 280 tokens. Each person in the group will, therefore, receive 70 tokens from the public account.

Your earnings in the task will be what you receive from the public account, added to whatever you put into your private account.

As before, the task that has just been explained to you will be repeated 8 times.

At the start of each new round, you will be given a new endowment of tokens with which you should make your decision. The number of tokens you receive depends directly on what you received in the first task.

If you originally received 700 tokens based on your grandparents being relatively high in the income distribution, then in this task, you will pay a tax of 100 tokens in each round. Therefore you will start with 600 tokens. That is 14% less than you began with in the previous task.

If you originally received 350 tokens based on your grandparents being relatively low in the income distribution, then in this task, you will receive 450 tokens, an increase of 100 tokens. This increase was raised from the tax on high inheritance individuals. This is a 22% increase on what you began with in the first task.

At the end of each round, the computer will tell you how many tokens are in the public account, and how much you each earn from the public account for that round.

In each of the 8 rounds, the computer will keep track of how many tokens you earn - from both the public account and your private account. Once all 8 rounds have been completed, the tokens earned in all 8 rounds will be added together to calculate your total tokens for the exercise. You will be informed of your total earnings the end of today's session and tokens will then be converted into rands at an exchange rate. For now, just remember that more tokens will represent more rands.

If you have any questions, please raise your hand now and I will come and answer them individually.

We will now begin the task. Remember that there are 8 rounds in this task and you will receive a new endowment of tokens at the start of each round.

Please click next to begin the task

Once you have completed your decision for this round please raise your hand.

Once all hands are raised: Please all select the "Next" option on your screen to view your earnings from this round. *Give some time for this, then,* Please all select "Next" To proceed to the following round.

So go through 8 rounds. At the end of 8 rounds:

Thank you. We have now completed that task.

Please click next and complete the brief questionnaire on your screen. Once you are finished, select "next" and raise your hand. Your total earnings from the entire session will now be displayed. The number of tokens will be converted into a rand amount using the conversion rate: 280 tokens = R3.

Please sit quietly at your computers while I come around and complete your invoice page. Once you have your invoice page completed by me you may leave quietly. Please do not talk to anyone while you are still in this room.

Post-Survey Questionnaire

1. What is your student number
 2. Please confirm your student number
 3. What is your name
 4. What is your email address
-
1. How many people participating in this session do you know?
 2. In your opinion, how many people in your group were the same race as you?
 3. What is your living arrangement?
 - a. I live in res
 - b. I live in a digs with others
 - c. I live on my own
 - d. I live with relatives
 - e. I live with my parents
 4. Please describe what you believe the purpose of this research was in one sentence?
 5. For each of the following please indicate to what extent you have felt this way over the past week?
 - a. Interested
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely
 - b. Distressed
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely
 - c. Excited
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely
 - d. Upset
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely
 - e. Strong
 - Very slightly or not at all
 - A little
 - Moderately

- Quite a bit
 - Extremely

- f. Guilty
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely

- g. Scared
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely

- h. Hostile
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely

- i. Enthusiastic
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely

- j. Proud
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely

- k. Irritable
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely

- l. Alert
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely

- m. Ashamed
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely

- n. Inspired
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely

- o. Nervous
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely

- p. Determined
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely

- q. Attentive
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely

- r. Jittery
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely

- s. Active
 - Very slightly or not at all
 - A little
 - Moderately
 - Quite a bit
 - Extremely

- t. Afraid

- Very slightly or not at all
- A little
- Moderately
- Quite a bit
- Extremely

1. Would you rather have a 1 in 10 chance of winning R100 and a 9 in 10 chance of winning R60
OR
Would you rather have a 1 in 10 chance of winning R150 and a 9 in 10 chance of winning R25
2. Would you rather have a 2 in 10 chance of winning R100 and a 8 in 10 chance of winning R60
OR
Would you rather have a 2 in 10 chance of winning R150 and a 8 in 10 chance of winning R25
3. Would you rather have a 3 in 10 chance of winning R100 and a 7 in 10 chance of winning R60
OR
Would you rather have a 3 in 10 chance of winning R150 and a 7 in 10 chance of winning R25
4. Would you rather have a 4 in 10 chance of winning R100 and a 6 in 10 chance of winning R60
OR
Would you rather have a 4 in 10 chance of winning R150 and a 6 in 10 chance of winning R25
5. Would you rather have a 5 in 10 chance of winning R100 and a 5 in 10 chance of winning R60
OR
Would you rather have a 5 in 10 chance of winning R150 and a 5 in 10 chance of winning R25
6. Would you rather have a 6 in 10 chance of winning R100 and a 4 in 10 chance of winning R60
OR
Would you rather have a 6 in 10 chance of winning R150 and a 4 in 10 chance of winning R25
7. Would you rather have a 7 in 10 chance of winning R100 and a 3 in 10 chance of winning R60
OR
Would you rather have a 7 in 10 chance of winning R150 and a 3 in 10 chance of winning R25
8. Would you rather have a 8 in 10 chance of winning R100 and a 2 in 10 chance of winning R60
OR
Would you rather have a 8 in 10 chance of winning R150 and a 2 in 10 chance of winning R25
9. Would you rather have a 9 in 10 chance of winning R100 and a 1 in 10 chance of winning R60
OR
Would you rather have a 9 in 10 chance of winning R150 and a 1 in 10 chance of winning R25



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UCT Commerce Faculty Office

03 July 2018

Mr Brynde Kreft
School Of Economics
University of Cape Town

REF: REC 2018/007/054

Dear Brynde Kreft,

The effect of intergenerational inequality on social cohesion

We are pleased to inform you that your ethics application has been approved. Unless otherwise specified this ethical clearance is valid for 1 year and may be renewed upon application.

Please be aware that you need to notify the Ethics Committee immediately should any aspect of your study regarding the engagement with participants as approved in this application, change. This may include aspects such as changes to the research design, questionnaires, or choice of participants. The ongoing ethical conduct throughout the duration of the study remains the responsibility of the principal investigator.

We wish you well for your research.

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10.5 Plagiarism declaration



Plagiarism Declaration

COMPULSORY DECLARATION:

1. This dissertation has been submitted to Turnitin (or equivalent similarity and originality checking software) and I confirm that my supervisor has seen my report and any concerns revealed by such have been resolved with my supervisor.
2. I certify that I have received Ethics approval (if applicable) from the Commerce Ethics Committee.
3. This work has not been previously submitted in whole, or in part, for the award of any degree in this or any other university. It is my own work. Each significant contribution to, and quotation in, this dissertation from the work, or works of other people has been attributed, and has been cited and referenced.

Student number	FSHBRY004
Student name	Brynde Kreft
Signature of Student	signature removed to avoid exposure online
Date:	11/02/19