

# The (negative) effects of inequality on Social Capital

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## Abstract

Inequality is perhaps one of the most challenging issues of our time. Empirical literature, using observational data, indicates that higher inequality is associated with lower social capital. Oftentimes, however, the causal effects of inequality are difficult to establish based on survey and empirical observations. To this end, we review a large body of experimental literature and assess the causal effects of inequality on experimental proxies for social capital. We find compelling evidence that inequality undermines trust, discourages cooperation, and encourages unethical behaviors. The overall effect on generosity is, however, less clear.

## KEYWORDS

experiment, fairness, inequality, social capital

## JEL CLASSIFICATION

D91, D63

## 1 | INTRODUCTION

Inequality has been on the rise in the past decades. In 2019, the total wealth held by the world's wealthiest 2000 individuals was \$8.7 trillion, making them wealthier than 50% of the population worldwide (Oxfam, 2020). In fact, the wealth of the bottom 55% of all adults in the world amounts to less than 1.3% of the total global wealth and the top 1% of wealth-holders possess more than 40%

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of the wealth (Credit Suisse, 2021). The recent shock of the COVID pandemic may have further exacerbated the problem (see, e.g., Perry et al., 2021).

The ever-rising economic inequality since the 1980s has been at the center of recent political debates and academic discussions for its negative effects on social outcomes. Many initiatives around the world are dedicated to combatting inequality. For instance, three out of the top 10 sustainable development goals (SDG) of the United Nations are about fighting poverty and restoring equality.<sup>1</sup> The European Union also committed itself to achieve these goals and, through its new 2017 European Consensus on Development, and to supporting partners worldwide. These initiatives are based on the common belief that higher levels of inequality are associated with undesirable social outcomes.

Inequality can be divisive and detrimental to social cohesion (Stiglitz, 2012). First, societies with greater inequality typically exhibit lower levels of social trust and trust in government (Alesina & La Ferrara, 2002; d'Hombres et al., 2013; Gould & Hijzen, 2016; Larsen, 2013; Paskov & Dewilde, 2012; Pickett & Wilkinson, 2010; Uslaner & Brown, 2005; Vergolini, 2011). Second, countries with higher inequality typically experience larger gaps in educational attainment and lower social mobility (Corak, 2013; Pfeffer, 2018; Pickett & Wilkinson, 2010). Third, a high level of inequality may also aggravate political instability, fuel antisocial behaviors, and undermine democracy (Acemoglu & Robinson, 2006; Alesina & Perotti, 1994, 1996; Kuhn et al., 2016). Inequality may eventually threaten economic growth (Banerjee & Duflo, 2003; Birdsall et al., 1995; Neves et al., 2016 for a meta-study) and ultimately lead to shorter, unhealthier, and unhappier lives as well as more societal conflicts (Alesina et al., 2004; Fajnzylber et al., 2002; Pickett & Wilkinson, 2010).

The negative correlation between social outcomes and inequality is largely demonstrated in the empirical literature. However, due to the nature of observational data, whether the relation is causal is often unclear. To this end, we inquire into the latest developments in the experimental literature on the causal effects of inequality on social outcomes such as social trust, cooperation, generosity, and antisocial/unethical behaviors. Inequality induced in the lab is unambiguous, directly observable, and free from issues of misperception (see a discussion in Marandola & Xu, 2021), although it may come with a cost of external validity given its modest size compared to the income/wealth differences in the field. However, one may argue that if relatively modest inequality in the laboratory leads to observable consequences, inequality may have a greater impact outside the lab.

In economic experiments, inequality is typically induced either exogenously through luck (e.g., a random endowment or a risky lottery) or endogenously through merit (e.g., a real-effort task). The causal effect of inequality on social behavior is then assessed through standard economic games and their variations. Trust or trustworthiness are often measured through variations of trust games or investment games (Berg et al., 1995); cooperation through public good games (Issac & Walker, 1988; Issac et al., 1984); generosity through dictator games (Forsythe et al., 1994); honesty through die-rolling games and mind games (Fischbacher and Föllmi-Heusi, 2013; Jiang, 2013); unethical behavior through money burning experiments (Abbink & Sadrieh, 2009; Abbink & Herrmann, 2011; Abbink et al., 2011; Fehr, 2018; Gangadharan et al., 2019; Grossman & Komai, 2013; Zizzo & Oswald, 2001).

Overall, we find that higher inequality has negative causal consequences on desirable social outcomes. For trust and trustworthiness, the negative effects of inequality depend on several factors, such as the source of inequality, whether the wealth of the counterparty is known, and participants' fairness concerns. Inequality is particularly harmful when it is endogenously induced, especially when one party is somewhat responsible for the (relative) poverty of the other party via their interactions (Fehr et al., 2020; Greiner et al., 2012; Hargreaves Heap et al., 2013). On the

other hand, if inequality is purely determined by luck and there are no obvious fairness concerns, then the effects of inequality are much weaker.

The negative effect of inequality on cooperation is more robust. Inequality decreases overall contribution to public goods, which in turn further increases inequality, harming economic growth (Camera et al., 2020; Gächter et al., 2017), and making individuals less connected to each other (Nishi et al., 2015). The decline in overall contribution to public goods is often due to the fact that the rich fail to contribute a fair share in relative terms, even though in absolute terms, they often contribute at least as much as the poor (Buckley & Croson, 2006; Cherry et al., 2005; Fung & Au, 2014; Hargreaves Heap et al., 2016). Once again, when social comparison is salient inequality has stronger negative consequences (Anderson et al., 2008; Nishi et al., 2015).

The effects of inequality on generosity such as charitable giving and volunteering activities are less consistent. Although there is some evidence suggesting that high inequality makes the rich stingier (Côté et al., 2015; Piff et al., 2010), the evidence does not bear out empirically in survey data and even experimental replications partially failed (Côté & Willer, 2020; Korndörfer et al., 2015; Schmukle & Egloff, 2020; Schmukle et al., 2019; Smeets et al., 2015; von Hermann & Tutić, 2019). More research is certainly warranted in this area.

Finally, the experimental literature suggests that high inequality causes unethical or anti-social behaviors. In anonymous settings, people are willing to engage in anti-social behaviors in the presence of inequality (Abbink & Sadrieh, 2009; Abbink & Herrmann, 2011; Abbink et al., 2011; Fehr, 2018; Gangadharan et al., 2019; Grossman & Komai, 2013; Zizzo, 2003; Zizzo & Oswald, 2001) and often feel justified to do so with the aim of restoring equality (Gino & Pierce, 2009; John et al., 2014). Social comparison, envy, and perceived unfairness often drive these undesirable social outcomes (Bigoni et al., 2021; Gino & Pierce, 2009, 2010; Grossman & Komai, 2013; John et al., 2014).

The rest of the paper is organized as follows. We review the experimental evidence on the effects of inequality on social outcomes and discuss the underlying mechanisms (Section 2). We conclude in Section 3. We describe the studies in detail in the appendix.

## 2 | EXPERIMENTAL EVIDENCE ON THE EFFECTS OF INEQUALITY ON SOCIAL INTERACTIONS

Apart from human nature's innate desire for economic fairness (Starmans et al., 2017), inequality matters because it is often associated with negative outcomes that divide societies (Stiglitz, 2012). It has been well-documented that societies with higher social capital enjoy a higher quality of government (Knack, 2002; Putnam, 1993), more developed financial systems (e.g., Guiso et al., 2004), and greater economic growth (e.g., Knack & Keefer, 1997; Whiteley, 2000; Zak & Knack, 2001). Thus, by threatening social capital, inequality may have large indirect economic consequences.

Unfortunately, most of the empirical evidence is about the existence of a correlation between inequality and social capital, as causality is difficult to prove due to omitted variables, endogeneity, and possible spurious correlations. Causal inferences based on empirical work rely on theoretical analysis that pre-identifies the channels through which inequality may affect social outcomes, or the use of instrumental variables (Jordahl, 2009). Yet, causal identification remains difficult or infeasible in some instances, depending on data availability.

The experimental method, on the other hand, allows for causal inference. By randomly allocating participants to environments with high or low economic inequality, the literature has successfully identified how inequality affects, trust, trustworthiness, cooperation, generosity,

and (un-)ethical behaviors (e.g., Bigoni et al., 2021; Côté et al., 2015; Fehr et al., 2020; John et al., 2014; Nishi et al., 2015). Although experimental evidence is subject to the criticism of low external validity, it still provides useful insights into people's responses to inequality and how this is context-dependent (source of inequality, observability, etc.). This evidence must then be interpreted taking into consideration how it transposes to a more complex and heterogeneous environment. In what follows, we review the recent findings on the effects of inequality for each outcome of interest.

We mostly limit our scope to lab(-in-the-field) studies published (working paper included) between January 2000 and December 2021 but mention survey experiments whenever they are highly relevant. We focus on works in economics but also include works in psychology, sociology, and political science when the topic of the study is highly relevant. A total number of 44 studies written between January 2000 and December 2021 are included in this survey. These studies are summarized in Tables 1–4. To search for the relevant literature, we used the search terms below. These search terms have been run on Google Scholar, JSTOR, Web of Science, and SSRN: full catalog of economics and social sciences (journals indexed by EconLit included).

1. Inequality and social capital or cohesion and experiment
2. Inequality and consequences and experiment
3. Inequality and trust or trustworthiness and experiment
4. Inequality and public goods or help or cooperation and experiment
5. Inequality and generosity or prosocial or prosociality and experiment
6. Inequality and antisocial or sabotage or cheating and experiment
7. Inequality and ethics or unethical behaviors and experiment

We screened the papers by title first. If the title passed the first pertinence screening or was suspected to be highly relevant, we read the abstract and decided whether the paper was sufficiently relevant.

## 2.1 | Trust and trustworthiness

Several authors have employed (some modified versions of) the trust game (Berg et al., 1995) to capture the effect of inequality on trust and trustworthiness. In the standard version of the game, there are two players: a first mover (the trustor) and a second mover (the trustee). The first mover can send a fraction of his initial endowment (between zero and the total available amount) to the second mover, knowing that the sent amount will be tripled. The second mover can then choose whether to return a fraction of the received sum (between zero and the tripled amount) to the first mover. The amount sent by the first mover measures her level of trust, while the amount returned by the second mover measures her trustworthiness.

The trust game can be a one-shot game or a repeated game<sup>2</sup>. The Nash equilibrium, using backward induction for this game, is that no money is sent to the second mover because second movers have no pecuniary incentive to return money to the sender, which also holds for repeated games. In the context of inequality, typically, experiments start with an inequality-inducing stage in which participants receive either a windfall of endowment (exogenously imposed inequality) or accumulate wealth through a task (endogenously induced inequality). They then play a trust game or a variant in the following stage(s).<sup>3</sup>

TABLE 1 Overview of experimental studies on trust and trustworthiness

	How is inequality induced?	Separate fund provided for trust game?	Endowment/wealth of partner known?	Effects on trust and trustworthiness
Anderson et al. (2006)	Luck	Yes	No (distribution known)	Trust (–) and trustworthiness (=).
Smith (2011)	Luck	No	Yes	Rich trust less than the poor (only in relative terms) but are more trustworthy.
Greiner et al. (2012)	Luck + own decisions	No	Yes	Trust (–) and trustworthiness (=)
Hargreaves Heap et al. (2013)	Luck + own decisions	No	No	Trust (=) and trustworthiness (=)
			Yes	Trust (–) and Trustworthiness (–)
Gallego (2016)	Induced perception of high/low-income inequality	n/a	n/a	Trust (–)
Bejarano et al. (2018)	Luck	No	Yes	Trust (–) and trustworthiness (–)
Guinjoan and Rico (2018)	Induced perception of high/low wealth inequality	n/a	n/a	Trust in European institutions (–)
Fehr et al. (2020)	Endogenously by merits	Yes	Yes	Trust (–) and trustworthiness (–)
Rodrigo-González et al. (2021)	Endogenously by merits	No	Yes	Trust (–)

Note: The signs “=” and “–”, respectively, suggest no change or a decreased level of trust and trustworthiness.

Table 1 summarizes the main findings of papers published since the year 2000 in chronological order. All the papers listed here are laboratory experiments using a (modified) trust game, except for Gallego (2016) and Guinjoan and Rico (2018). These two papers are survey experiments in which trust is measured by means of a questionnaire. In Table 1, we report the chosen method to induce inequality, whether there is a separate endowment for the trust game, and whether the endowment/wealth of the counterparty is known. We summarize the results of the papers in the last column. In Appendix A.1 we describe each study in greater detail.

We can see from the table that the effects of inequality on trust and trustworthiness are not as clear as one might expect based on conventional wisdom (e.g., Putnam, 2000). What is clear, however, is that the source of inequality matters for trust. If inequality is purely due to luck, such that subjects are randomly assigned to have a high or low endowment, the effects of inequality are rather small. On the other hand, inequality is particularly harmful to trust when it is endogenously

**TABLE 2** Overview of experimental studies on the effects of inequality on cooperation

	<b>How inequality is induced</b>	<b>Income/wealth members known?</b>	<b>Effects on cooperation</b>
Cardenas (2003)	Real wealth outside the lab	Yes	Cooperation (–)
Cherry et al. (2005)	Luck or Merits	Yes	Cooperation (–)
Cardenas (2007)	Real wealth outside the lab	Yes	Cooperation (–)
Anderson et al. (2008)	Luck	No (distribution known)	Cooperation (–)
Buckley and Croson (2006)	Luck	Yes	Cooperation (–), compared with other repeated PG in the literature.
Sadrieh and Verbon (2006)	Luck	Yes	Cooperation (=)
Tavoni et al. (2011)	Luck	Yes	Cooperation (–)
Burton-Chellew et al. (2013)	Luck	Yes	Cooperation (–)
Reuben and Riedl (2013)	Luck	Yes	Cooperation (=): all free riding.
Maurice et al. (2013)	Luck	Yes	Cooperation (=)
Fung and Au (2014)	Luck	Yes	Cooperation (–)
Nishi et al. (2015)	Luck	Yes	Cooperation (–) when inequality is visible
Hargreaves Heap et al. (2016)	Luck	Yes	Cooperation (–)
Gächter et al. (2017)	Endogenously induced	Yes	Cooperation (–) over time.
Paetzel and Traub (2017)	Merits (IQ)	Yes	Cooperation (–)
Camera et al. (2020)	Endogenously induced	Yes	Cooperation (–)
Martinangeli and Martinsson (2020)	Luck	Yes	Cooperation (–), insignificant.
Markussen et al. (2021)	Luck	Yes	Cooperation (–)

Note: The signs “=” and “–”, respectively, suggest no change or a decreased level of public goods contribution.

induced and one party is somewhat responsible for the (relative) poverty of the counterpart via their interactions (Fehr et al., 2020; Greiner et al., 2012; Hargreaves Heap et al., 2013). These results suggest that the wealth-generating process matters because the belief that the process leading to inequality is unfair generates negative reactions.

The papers reviewed also suggest that the effects of inequality on trust and trustworthiness depend on whether individual wealth is known, and on how this information interacts with fairness considerations. Inequality affects people's trust more when relative positions are known. The effects are heterogeneous, depending on relative income. The rich tend to trust more when their

TABLE 3 Overview of experimental studies on the effects of inequality on generosity

	How is inequality induced?	Income/wealth members known?	Effects on generosity
Côté et al. (2015)	Randomly determined perceived inequality	Yes	(-): the rich become less generous when perceived inequality is high
Côté and Willer (2020)	As above	Yes	(=): the rich are not giving less when inequality is high
Smeets et al. (2015)	Random matching	Yes	(+): the rich are more generous towards the poor than towards the rich.
Chiang and Chen (2019)	Chance or merits, depending on treatment	Yes (agents self-select into a high/low inequality environment)	(-): the rich are more generous in absolute terms, unless self-selected to be in the high inequality environment.
Duquette and Hargaden (2021)	Random	Yes	Lower average donation due to inequality (-)

Note: The signs "=", "+", and "-", respectively, suggest no change, increase, or a decreased level of generosity.

income is observable, probably for reputational concerns (Anderson et al., 2006), while when individual relative positions are not known, the rich do not trust more than the poor (Smith, 2011).<sup>4</sup> Under inequality, the poor become less trustworthy (Bejarano et al., 2018; Fehr et al., 2020) while the rich become more trustworthy (Smith, 2011), suggesting that there is a preference for greater equality. Consistently with this result, there is some evidence that participants trust the rich more than the poor (e.g., Hargreaves Heap et al., 2013).

## 2.2 | Cooperation and public goods provision

One of the most important indicators of a well-functioning society is people's willingness to contribute to public goods. Indeed, "thousands of churches, music halls, libraries, scientific laboratories, art museums, theatres, and other such facilities have been financed by voluntary contributions to fund drives conducted by private societies.", as noted in Smith (1980). Private provision of public goods has been widely studied in social sciences (see Ledyard, 1995 for a review, Zelmer, 2003 for a meta study, Croson, 2010 for a cross-discipline discussion). Due to their non-excludable nature, financing public goods is often an issue. In fact, classic economic models with selfish agents would typically predict free-riding and underprovision of public goods.

Cooperation and public goods provision are studied in experimental economics through public goods games. The decision environment employed by most of the studies is known as the linear public goods game, popularized by Issac et al. (1984) and Isaac and Walker (1988). The gist of the game is a voluntary contribution mechanism (VCM) that can be described as follows. Everyone in a group of size  $N$  faces a series of (or a one-shot) investment-like decisions. At the start of each period, each player is endowed with  $e_i$  tokens. Participants simultaneously choose the amount ( $x_i$ ) to invest in the public account (contributing to public goods) and the amount ( $e_i - x_i$ ) to keep for themselves. The total amount  $T$  that participants invest in the public account is multiplied by

**TABLE 4** Overview of experimental studies on the effects of inequality on antisocial and unethical behaviors

	<b>How is inequality induced?</b>	<b>Income/wealth members known?</b>	<b>Effects on antisocial or unethical behaviors</b>
Zizzo and Oswald (2001); Zizzo (2003)	Luck and investment decision	Yes	Money burning is frequent, but no equality conditions.
Dawes et al. (2007)	Luck	Yes	Agents are willing to pay to reduce inequality, moderated by emotions (+)
Gino and Pierce (2009)	Luck	Yes	Cheating (+), moderated by emotions.
Gino and Pierce (2010)	Merit	Yes	Cheating (+)
Abbink et al. (2011)	Luck	Yes	Rioting (+), but the poor eventually give up as inequality looms larger.
Houser et al. (2012)	Luck (randomly assigned role in a dictator game)	Yes	Cheating (+)
Gill et al. (2013)	Randomly determined wage in a real effort task	Yes	Cheating (+)
Grossman and Komain (2013)	Luck	Yes	Money burning (+)
John et al. (2014)	Luck	Yes, in one of the two conditions.	Cheating (+) only when other people's income is known.
Fehr (2018)	Merit	Yes	Money burning (+), not due to inequality per se, but unfair competition.
Gangadharan et al. (2019)	Random and investments favoring the rich	Yes	Money burning (+) but mitigated if the rich and poor shared social identity.
Bigoni et al. (2021)	Random	Yes	Money burning (+), more so when the unequal situation could have been avoided.

Note: The signs “=” and “+”, respectively, suggest no change or an increased level of anti-social or unethical behaviors.

a factor  $m$  (the marginal per capital return) and then equally distributed to the group. The total earnings are determined by the sum of tokens in the private and public accounts:

$$e_i - x_i + m \sum_{j=1}^N x_j$$

The problem of public goods provision arises when  $1/N < m < 1$  because in this case, the Nash equilibrium predicts that participants do not invest in the public account. Yet, the Pareto (social) efficient outcome would be to collectively invest all their endowments in the public account. When  $m > 1$ , there is no public provision problem, as the yield of the public account exceeds that of the private account. The standard result of the public goods game is that in one-shot trials and in the initial stage of the finitely repeated trials, subjects contribute non-zero amounts to the

public account, halfway between the Pareto-efficient level and the free-riding level. In the case of repeated games, contributions typically decline over time (Ledyard, 1995).

Inequality in public goods games is induced in the laboratory setting with different methods. Anderson et al. (2008) use a random show-up fee and provide a separate fund for the public goods game. Most of the studies induce inequality through random endowments (Buckley & Croson, 2006; Cherry et al., 2005<sup>5</sup>, Fung & Au, 2014; Keser et al., 2014; Maurice et al., 2013; Nishi et al., 2015; Sadrieh & Verbon, 2006; Hargreaves Heap et al., 2016). Alternatively, as in the experiments by Gächter et al. (2017) and Camera et al. (2020), subjects start with equal endowments, and income heterogeneity is endogenously induced by subjects' decisions. By comparing average contributions (or their variances) in public goods games under equality with those under inequality, the experimental literature shows the causal effects of inequality on cooperative behaviors.<sup>6</sup>

The neutrality theorem of Warr (1983) and Bergstrom et al. (1986) would suggest that the underprovision of public goods is not aggravated by inequality, as the rich would contribute more to compensate for the reduction of the contribution by the poor. However, the literature review by Ledyard (1995) shows that the heterogeneity of resources tends to decrease contributions. In Table 2, we review the experimental work published after the year 2000 on inequality and public goods provision (see Zelmer, 2003, for a review of earlier contributions). As shown in the last column of Table 2, most of the papers in the literature show that inequality is harmful to cooperation, regardless of how inequality is induced (Cherry et al., 2005). This result is consistent with Zelmer (2003)'s meta study for earlier findings in the literature. In Appendix A.2 we describe each study in more detail.

The decline in overall contribution to public goods under inequality stems from the fact that the rich's contribution in relative terms is not large enough to offset the decline in contribution by the poor (due to a smaller endowment), compared to the case without inequality. The rich fail to contribute a share that would sustain cooperation, even though in absolute terms, they often contribute at least the same as the poor and often more (Buckley & Croson, 2006; Cherry et al., 2005; Fung & Au, 2014; Hargreaves Heap et al., 2016; Hauser et al., 2021; Markussen et al., 2021). Reuben and Riedl (2013) show that when punishment is possible in public goods games, individuals enforce a norm of proportional contributions, which suggests that in absolute terms, the rich are expected to contribute more.

Moreover, according to Fung and Au (2014), the negative effect of inequality becomes stronger when the income distribution is heterogeneous (people all have different income levels) compared to when it is hegemonically distributed (wealth is highly concentrated). This phenomenon is consistent with social identity theory in that individuals with different incomes are more likely to form personal identities and become more self-focused. In the hegemonic case, on the other hand, low-income individuals are more likely to form a shared social identity with other low-income people and thus contribute more to society. Paetzel and Traub (2017) vary the skewness of the distribution of initial endowments to reflect the social distance between "elite" players (high initial endowments) and other players (lower endowments). They find that cooperation is lowest when the distribution of endowments is right-skewed. Results by Fung and Au (2014) and Paetzel and Traub (2017) show that the form that inequality takes is relevant, thus they are particularly relevant for their implications in terms of redistribution policy. Lastly, both Anderson et al. (2008) and Nishi et al. (2015) show that the negative effects of wealth inequality are exacerbated when inequality is more visible or salient. Therefore, the degree of exposure to inequality and its perception, more than inequality per se, may change people's prosocial behaviors. For example, uncertainty regarding the degree of inequality in the economy also deteriorates cooperation (Camera et al., 2020), as biased perceptions may lead to an overestimation of inequality.

A few papers do not find negative consequences of inequality on cooperation, such as Sadrieh and Verbon (2006), Maurice et al. (2013), Reuben and Riedl (2013)<sup>7</sup>, Markussen et al. (2021), and Martinangeli and Martinsson (2020)<sup>8</sup>. In Sadrieh and Verbon (2006) and Maurice et al. (2013), a positive contribution to public goods is the Nash equilibrium. Thus, the game has a more cooperative nature than the standard game described earlier. Subjects play the Nash equilibrium regardless of whether inequality is present or not. Thus, deterioration of contribution in the presence of inequality is not observed. This finding suggests that cooperation can be sustained in presence of inequality by improving the efficiency of the public good provision or by disincentivizing free riding.

Overall, unlike trust and trustworthiness, the literature gives a clearer picture of the relationship between inequality and cooperation: inequality is detrimental to cooperation, which in turn exacerbates the inequality problem, harming economic growth (Camera et al., 2020; Gächter et al., 2017)<sup>9</sup>, reducing coordination in fighting climate change (Tavoni et al., 2011), especially when the risk of suffering from climate change is unequal (Burton-Chellew et al., 2013), and making individuals less connected with each other (Nishi et al., 2015).

### 2.3 | Generosity and prosociality

Generosity, such as volunteering, donations, and helping others, is a key component of social capital. In the experimental literature, the dictator game (Forsythe et al., 1994) is one of the most widely employed tools to measure generosity or altruism. In a typical dictator game, the first mover receives some money, say \$10, that he must divide between him/herself and a recipient, who is a passive player. The amount of money (which can be also zero) the dictator sends to the recipient is used as a measure of generosity.

Empirical evidence using observational data has not been settled on the effect of inequality on generosity. For instance, Payne and Smith (2015) find that in Canada higher inequality leads to more charitable giving, whereas Duquette (2018) finds otherwise using U.S. data.

As shown in Table 3, the experimental literature has also not come to an agreement on the effect of inequality on generosity. A detailed description of the papers is provided in Appendix A.3<sup>10</sup>. Some findings suggest that in areas with high economic inequality rich are less generous. For example, Côté et al. (2015) find that rich people become less generous when there is more inequality. They hypothesize that wealthy individuals are more self-focused and feel entitled to wealth (see also Piff et al., 2010) when inequality increases. Schmukle et al. (2019), on the other hand, find no negative correlation between inequality and generosity in terms of charitable donations, dictator game donations, and volunteering activities by means of a large survey study.<sup>11</sup> On the contrary, they find that countries with greater inequality are characterized by higher levels of volunteering (see also Korndörfer et al., 2015, for more empirical results based on survey data), and that the wealthier volunteer more (similar to von Hermann & Tutić, 2019). These results are similar to those reported by Smeets et al. (2015) who show that the rich are much more generous when inequality is high. Côté and Willer (2020) attribute differences in findings to cultural differences (Europe vs. the US). More recently, Duquette and Hargaden (2021) report that higher inequality is associated with lower average donation. Interestingly, they find a robust U-shape pattern: lower-income individuals and rich individuals contribute larger shares, while medium-income individuals contribute the least in relative terms. Scant and mixed experimental and empirical findings certainly call for more research in this area.

## 2.4 | Antisocial and unethical behaviors

Economic inequality is linked to a number of anti-social behaviors such as road/air rage (Kawachi, 2002; DeCelles & Norton, 2016), violence, or vandalism (e.g., Abbink & Herrmann, 2011; Abbink & Sadrieh, 2009). The experimental literature proxies antisocial behavior by employing the so-called “money burning experiment”, pioneered by Zizzo and Oswald (2001). In the first stage of this game, subjects accumulate wealth either by chance or by effort, thus ending up with unequal wealth. Then in the second stage, subjects can “burn” the counterpart’s earnings at a cost. The cost function for burning the other person’s money is typically convex. It has been well documented that disadvantaged players burn the advantaged players’ earnings in the presence of inequality (see Table 4).

Inequality can induce or justify unethical conduct (Gino & Pierce, 2009, 2010; John et al., 2014). Several authors have studied cheating behavior in the presence of inequality to test for its effects on unethical behavior. The (modified version of the) mind game (Jiang, 2013) is often employed (see also the coin flip game in Houser et al., 2012; and the die-rolling experiment by Fischbacher & Föllmi-Heusi, 2013) to measure unethical behavior. Individuals make private guesses on the realization of the random outcome of a die or any other randomization device<sup>12</sup>. They receive a payment if the private guess matches the realization. Since subjects’ guesses are unobservable, they can cheat on the outcome of the matching without risking being detected. Cheating can be estimated at the group level afterward by comparing outcomes to the objective probability of correct guesses. As subjects’ payoffs depend on self-reported guesses, they have incentives to cheat to maximize their monetary payoffs. Cheating has been measured also by asking to self-report performance in a real-effort task (e.g., Gino & Pierce, 2009). The individual performance is then compared to the group average to estimate the chance of overstatement. In this literature review, we only include studies on cheating where there is inequality, and such inequality is known to all (or some) participants.

As shown in Table 4, and described in more detail in Appendix A.4, people are willing to engage in anti-social behaviors in the presence of inequality (Abbink & Sadrieh, 2009; Abbink & Herrmann, 2011; Abbink et al., 2011; Fehr, 2018; Gangadharan et al., 2019; Grossman & Komai, 2013; Zizzo, 2003; Zizzo & Oswald, 2001) and often feel justified to engage in unethical behaviors in the name of restoring equality (Gino & Pierce, 2009, 2010; John et al., 2014). John et al. (2014) find that people do not cheat much when they are equally poor, but when income inequality is salient, people cheat much more to catch up with earnings. Social comparison, envy, and a sense of unfairness often drive these undesirable social outcomes (Bigoni et al., 2021; Gino & Pierce, 2009; Grossman & Komai, 2013; John et al., 2014). Guilt also plays a role when attempts to restore equality are made by the advantaged players (Gino & Pierce, 2009). Finally, studies on antisocial behavior find that retaliation arises even within class, but it is moderated by social identity (e.g., Gangadharan et al., 2019).

Fehr (2018) points out the relevance of procedural fairness in explaining antisocial behaviors. Inequality does not necessarily lead to significantly more antisocial behavior if it can be clearly attributed to effort, but it does when inequality is randomly generated. Even harsher reactions arise when advantaged players who could avoid inequality fail to do so (Bigoni et al., 2021). In the unethical behavior literature (i.e., cheating) the effect of the source of inequality is more widely studied. Gino and Pierce (2010) find that people cheat to restore equality even when merit is the source of inequality, while other studies find that procedural fairness reduces willingness to cheat (Gill et al., 2013; Gsottbauer et al., 2022; Houser et al., 2012).

### 3 | CONCLUSION AND DISCUSSION

Widespread increases in income and wealth inequality have been a long-standing challenge to our societies and have raised concerns about their impacts on political and social outcomes. Empirical evidence suggests that societies with greater inequality typically exhibit a lower level of social trust and cohesion (Alesina & La Ferrara, 2002; d'Hombres et al., 2013; Gould & Hijzen, 2016; Larsen, 2013; Paskov & Dewilde, 2012; Pickett & Wilkinson, 2010; Vergolini, 2011). A high level of inequality may even exacerbate antisocial behavior, aggravating political instability (Acemoglu & Robinson, 2006; Alesina & Perotti, 1994, 1996; Kuhn et al., 2016; Verme, 2014).

Complementing empirical studies based on observational data, this literature review investigates the causal consequences of inequality on experimental proxies of social capital such as trust, cooperation, generosity, and unethical and antisocial behaviors. The literature suggests that inequality has negative causal impacts on these variables. It is detrimental to trust, trustworthiness, and cooperation, and encourages unethical and antisocial behaviors. The effect on generosity, however, is not very clear.

Some context-related features amplify the effect of inequality. First, the negative impact of inequality is stronger when the level of inequality is known. When information about relative wealth becomes salient, social comparison influences behavior. Several studies have shown how wealth visibility strengthens the negative consequences of inequality (Anderson et al., 2006, 2008; Hargreaves Heap et al., 2013; Nishi et al., 2015). Moreover, information on the identity of the rich, as opposed to knowledge about the distribution only, has stronger effects. Second, the generating process largely impacts the effects of inequality. For instance, in Bejarano et al. (2018), initial inequality is innocuous, while inequality generated by income shocks, has more negative consequences. Often, the effects are more negative when the process is perceived to be unfair, although fairness views change across contexts and over time. Individuals may find random wealth assignment to be fair, while inequality resulting from competition to be unfair. For instance, in Fehr et al. (2020), participants find the tournament payment scheme that led to high inequality to be unfair. Thus, the source of inequality matters but it is difficult to establish clear fairness boundaries (see Fehr et al., 2021). Thirdly, endogenously induced inequality typically has stronger effects (Camera et al., 2020; Fehr et al., 2020; Gächter et al., 2017; Greiner et al., 2012; Hargreaves Heap et al., 2013). In this case, the rich can typically be held accountable for the low income of the poor. If the success of the rich is suspected to be due to involvement in morally questionable activities instead of merit, the negative effect of inequality is stronger (Fehr, 2018). Relatedly, unfairness fosters negative emotions such as anger or envy, which in turn leads to unethical or even anti-social behaviors (Gino & Pierce, 2009, 2010; Grossman & Komai, 2013). This is especially true when advantaged individuals can reduce inequality but fail to do so (Bigoni et al., 2021).

It is also worth noting that a number of studies that we reviewed in this article have started to incorporate more realistic features of real-world inequality or study the effects of inequality in a less abstract setting (e.g., Burton-Chellew et al., 2013; Gächter et al., 2017; Greiner et al., 2012; Hauser et al., 2021; Nishi et al., 2015; Tavoni et al., 2011). Outside the experimenters' lab, it is often the case that the degree of inequality is not clearly known. In this case, how people perceive inequality is important and empirical evidence shows that people often get it wrong (see, e.g., Jachimowicz et al., 2022; Marandola & Xu, 2021, and references therein), which can have disastrous consequences.

To summarize, the experimental literature supports the view that high inequality leads to undesirable social outcomes. The findings call for policies that aim to bring more equality to society

through better institutional and redistribution mechanisms that aim at mitigating the negative consequences of inequality and at reducing it. Moreover, distribution policies should hinge on the behavioral mechanisms highlighted in this review, such as reputational and social concerns, which incentivize rich people to contribute more, especially relative to their wealth. Finally, the distribution of inequality in society seems to be crucial for understanding social cooperation (Fung & Au, 2014), as more hegemonic distributions seem less problematic than heterogeneous ones. This aspect certainly requires further research, as it might also explain cross-country differences in the effects of inequality.

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## ENDNOTES

<sup>1</sup><https://sdgs.un.org/goals>

<sup>2</sup>In repeated games, usually one randomly selected round of the trust game matters for the final payment of subjects to minimize potential income effects.

<sup>3</sup>In some experiments, trustors are asked to invest the amount from the first stage in the trust game (Bejarano et al., 2018; Greiner et al., 2012; Hargreaves Heap et al., 2013; Smith, 2011), in other experiments, trustors receive a separate endowment to be used in the trust game (Anderson et al., 2006; Fehr et al., 2020).

<sup>4</sup>Using both an online and a lab experiment, Albertazzi et al. (2021) study the effects of inequality on beliefs of meritocracy and social trust (belief that others will reward us fairly for our effort). They find that higher (lower) relative position has a positive (negative) causal effect on social trust and induces stronger (weaker) belief in the existence of meritocracy (attributing success to ability and effort instead of luck).

<sup>5</sup>Cherry et al. (2005) also have a condition in which the initial endowment is earned, instead of randomly assigned (but it does not affect the results).

<sup>6</sup>Other types of inequality, other than income/wealth inequality, have also been studied in the literature. For instance, another strand of literature looks at the effects of inequality/heterogeneity of marginal benefits of public goods on cooperative behaviors, but agents do start with the same amount of endowment for the public goods game. In other words, the “rich” benefit more from the public goods while the “poor” benefit less (see, e.g., the design by Nousseir & Tan, 2011). Brañas-Garza et al. (2021) show that the average contribution level decreases dramatically when subjects are aware of the inequality in marginal returns. Similarly, Brent et al. (2019) study the effect of capacity inequality in common pool resource framework in which some agents can extract more resources than others. They find that in the presence of capacity inequality, tax and redistribution are needed to prevent over-extraction. Hauser et al. (2019) allow for a combination of various sources of inequality (productivity, endowment, and marginal benefits). They find that high inequality prevents cooperation, and the overall welfare is maximized when the two sources of heterogeneity are aligned such that more productive individuals also receive higher endowments. However, these lines of literature are out of the scope of the current review, as we focus mostly on income/wealth inequality.

<sup>7</sup>In Reuben and Riedl (2013), in the absence of punishment, inequality does not further reduce cooperation because people converge to the free-riding equilibrium even without inequality.

<sup>8</sup>Both Martinangeli and Martinsson (2020) and Markussen et al. (2021) find that inequality reduces cooperation, though the effect is insignificant.

<sup>9</sup>Ku and Salmon (2012) also find that inequality reduces effort provision in a labor market context, which has been interpreted to be detrimental for growth.

<sup>10</sup>Here, we focus only on papers that specifically look at the effects of different levels of inequality on donors' behavior, thus we don't report all the papers in which proposers and receivers start with different endowments (just like a standard dictator game), unless the authors explicitly study the role of inequality.

- <sup>11</sup> However, it should be noted that Schmukle et al. did not experimentally manipulate the perception of inequality. Therefore, we do not include this study in Table 3.
- <sup>12</sup> For instance, in Gsottbauer et al. (2022), the experimenter first asks the subjects to privately choose a letter from A to K and then let the computer randomly choose a letter (each with an equal chance to be chosen). If the realized letter turns out to be the same letter the subject has in mind, then she will win a prize. The experimenter can detect whether people cheat on average by comparing outcomes with the objective probability to get the prize.
- <sup>13</sup> The common pool resource game is similar to public goods game, except that the former is rivalrous and thus fall prey to issues of overconsumption.
- <sup>14</sup> This result is replicated by Keser et al. (2014) who implement a similar design.
- <sup>15</sup> The authors decide to use a non-linear public goods game because it has interior Nash-equilibria, and it is not necessarily the case that the group efficiency is the highest when everybody contributes the full amount. In other words, over-contribution is possible in this game.

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## APPENDIX

### TRUST AND TRUSTWORTHINESS

Anderson et al. (2006) vary the show-up fee to exogenously induce various degrees of inequality (none, medium, and high) prior to the trust game. The show-up fee is awarded publicly via a ceremony or privately, in both cases, the distribution of the possible show-up fees is common knowledge. Under the public award, participants see who receives higher show-up fees, but their identity remains anonymous when playing the trust game. The trust game is repeated, and in each round, the first mover receives \$10 to invest in the trust game, independently of the show-up fee. The authors find that inequality has a weak negative effect on trust when it is induced privately. Interestingly, the wealthier participants send more money to the second mover compared to the no inequality condition when inequality is induced publicly. Reputation and social concerns make wealthier participants send more to their counterparts, rather than inequality per se. Overall, the

effects of inequality on trust reported in this study are weak. Inequality has no significant effect on trustworthiness.

Instead of varying the show-up fee, Smith (2011) varies the endowment to be used in the repeated trust game. Half of the subjects receive the high endowment; the other half receive the low endowment in each round. Subjects know the endowment of their counterpart. The results show that participants with a high endowment are more trustworthy both in absolute and in relative terms, returning more than the others regardless of the condition of the first mover. However, they trust less in relative terms (but trust more in absolute terms), as they send a lower percentage of their funds (higher absolute amount) than participants with the low endowment. The overall effects of inequality on trust and trustworthiness are not reported in the paper.

Greiner et al. (2012) examine whether inequality affects economic efficiency and growth through trust. The workhorse of the experiment is a modified version of the trust game embedded in a growth game. The modified trust game has an efficiency multiplier that equals 1.2 instead of 3 (commonly used in the trust game), and a minimum *mandatory return* rate of 90% of the amount sent. In (in)equality treatment, subjects start with an (un)equal amount of funds that can be used in the trust game. Income earned in the trust game cumulates across periods, for a total number of twenty periods. Thus, inequality can also arise endogenously. Before making decisions, both players are informed about the current wealth of their opponent, thus the level of inequality is made salient. Players are anonymously matched into dyads and randomly assigned a role in each period. The mixed effects regressions on the proportion of wealth sent and returned suggest that inequality has a detrimental effect on trust and no effect on trustworthiness. In terms of individual decisions, they do not find many behavioral differences between the rich and poor overall.

Hargreaves Heap et al. (2013) employ both a standard trust game and a modified labor market game (Fehr et al., 1993). In the labor market game, the employer (trustor) makes a wage offer to an employee (trustee) who decides what effort level to provide at a cost. There are three treatments in total. In the baseline treatment, there is no inequality. In the two inequality treatments, subjects are randomly assigned a high, low, or medium income. The income distribution is always known, but only in one treatment do subjects know the exact income level of their counterpart. The results show that inequality does not have a significant negative effect on trust in the standard trust game context, but it makes trustworthiness go down by as much as 25%, provided that the wealth of the trustor is known. In the labor market context, inequality makes wages lower (which means less trust), and average effort (trustworthiness) is lower when the income of the employer is known. The results are weaker when the exact income of the counterpart is unknown. Lastly, there is evidence that low-income players trust the high-income players more than the low-income ones, though they return less to the high-income players as in Smith (2011) and Fehr et al. (2020).

In Bejarano et al. (2018) inequality can be randomly determined at the start of the game, or it can be the result of a random shock (i.e., subjects have the same endowment at the outset but before they play the trust game, a shock may reduce the second mover's endowment). In their experiment, the first mover always has a high income while the second mover either has the same or a lower income. It turns out that inequality per se does not harm trust (when it is randomly determined, not because of a shock), but trust decreases if the trustee becomes poor due to a random shock. As explained by the authors, this happens because trustors (correctly) believe that if trustees have reference dependent utility, it would then be less likely that they return the amount sent to them because they may want to compensate for the shock. The trustworthiness of the poor is lower regardless of the source of inequality (shock vs. initial).

Fehr et al. (2020) induce inequality through a real-effort task in dyads. The task pays off either via a piece-rate (small inequality) or through a tournament (large inequality). The payoff of the

paired participant in the real-effort task is known. The results confirm that inequality is corrosive to both trust and trustworthiness. The negative effects on trust are driven by both the rich and the poor, while the effect on trustworthiness is driven by the poor. To evaluate the boundary of such effects, the authors run an additional treatment that randomly rematches subjects after the tournament stage such that the members in the dyads are not directly responsible for the other person's wealth level. The results show that in this case, inequality has no negative effects on trust and trustworthiness.

Rodrigo-González et al. (2021) induce unequal endowments for the trust game with a real effort task (consists of math and general knowledge tests) where performance determines the endowment. They find that the overall level of trust decreases significantly in this treatment compared to the baseline where there is no endowment inequality. There is no straightforward conclusion on the effect of trustworthiness.

### COOPERATION AND PUBLIC GOODS PROVISION

Cardenas (2003, 2007) examine the effect of wealth on cooperation in a series of lab-in-the-field experiments in rural villages in Colombia. Villagers who know each other's real-world wealth are brought together in an experimental environment to examine how wealth heterogeneity would affect the utilization of a common resource. Instead of a public goods game, the experiments employ a common pool resource game (Ostrom et al., 1994)<sup>13</sup>. The decision-maker must decide on how many resources to take away from the forest, as the best response to the other seven participants' decisions made simultaneously. Cardenas (2003, 2007) find that greater wealth inequality among the group members is associated with reduced levels of cooperation. In particular, the wealthier individuals are playing the Nash strategy more often, leading to worst group outcomes. The observed effects are only correlational and not causal, in the absence of anonymity, wealth heterogeneity may be correlated with other factors (i.e., group identity, closeness, familiarity with the common pool resource problem in real life) that might explain the observed differences in contribution. It is nevertheless interesting that lab findings generalize to a more natural setting.

Cherry et al. (2005)'s experiment has two stages. In the first stage, participants either receive a windfall of endowment or have to earn their endowment through a test based on GMAT questions. In the second stage, four subjects are randomly grouped, and they can observe other people's endowment. The group can be homogenous in terms of endowment, but it can also be heterogeneous. The authors find that contributions fall significantly when endowments are heterogeneous, but they find that the source of the endowment does not influence the results.

In Sadrieh and Verbon (2006) the game consists of five rounds and choices are simplified as Sabotage, Nash Equilibrium, and Cooperation. Players know their own income as well as that of other players. Importantly, the payoff function is parameterized such that in equilibrium, it is optimal to contribute a non-zero amount to the public good. Furthermore, the optimal contribution level is proportional to the endowment subjects have. To test the effect of inequality, Sadrieh and Verbon (2006) vary the degree of inequality (Gini = 0.1, 0.25, 0.5), as well as the skewness of the endowment distribution (one rich two poor, or two rich one poor). They find that none of these conditions has any effects on the likelihood of cooperation: in most cases, people simply play the Nash strategy.

In Buckley and Croson (2006), participants play a repeated public goods game for 10 rounds. At the end of each round, players see the average amount invested in the public account by the group, their own investment, their earnings from the last round, their accumulated earnings, as well as the average wealth of the group to date. Participants know the distribution of the endowment as well as how they stand relative to other players. Since the authors do not have a baseline treatment

without inequality, parameters are chosen to be consistent with the previous literature. They find that the average group contribution level (in absolute terms) in the first round of the public good game is lower than that in similar experiments without inequality. However, there is no difference between the high- or low-endowment individuals in terms of their absolute contributions, which implies that relative contributions are higher for the low-endowment individuals. This result suggests that the decrease in cooperation is driven by the high-endowment participants who fail to contribute a fair share (the authors interpret the fair share as one fourth of their endowment, as there are four members for each group).

In Anderson et al. (2008), the show-up fees are awarded either publicly or privately. In both conditions, everyone knows the distribution of the show-up fees. In the public condition, show-up fees are awarded via a ceremony so that who possess what show-up fees are known (though the identity of participants remains anonymous) while subjects do not know individual show-up fees in the private condition. The amount that can be invested in the public goods game is provided separately and it is fixed for everyone. Anderson et al. (2008) find that when individuals' relative standing is made salient through public information, all group members reduce their contributions to public goods. This behavior differs from Anderson et al. (2006) who show that the negative effect of wealth inequality in trust games only manifests itself if the show-up fees are privately awarded. Anderson et al. (2008) explain this mechanism through social status: if the public award of show-up fees establishes high social status, it may depress contribution when the low-status group uses low contribution as a protest. If the high-status individuals reciprocate with low contributions, the result is a lower overall level of contribution. It is not clear, however, why the social status explanation does not also affect trustworthiness in the trust game (Anderson et al., 2006).

In Tavoni et al. (2011), subjects are randomly assigned to a six-person group to participate in a repeated (modified) public goods game, trying to avoid disastrous "climate change". Subjects are informed that if they fail to reach the target in the public account, they will lose all their remaining money with a 50% probability. The game has 10 rounds, with the first three rounds featuring various levels of predetermined individual contributions (this is how inequality is induced). In the subsequent seven rounds subjects can choose the level of their investment. Subjects are informed about the individual contributions and the group contribution for each round, as well as the cumulative individual and group contributions up to that round. The authors find that inequality reduces the prospects of reaching the target, but communication increases success dramatically with rich players signaling a willingness to contribute.

Burton-Chellew et al. (2013) add one additional realistic feature to the design. Agents do not only differ in the resources that they have to mitigate climate change, but they also differ in the consequences that they face due to climate disasters. They find that when inequality in resources is combined with a greater relative risk for poorer members, cooperation collapses compared to the equality condition. The effect is driven by the rich investing proportionally less into preventing climate change when they are less at risk.

In Reuben and Riedl (2013), the authors examine how groups with endowment inequality affect cooperation in a repeated linear public goods game with or without punishment. In the heterogeneous groups, one person has an endowment that is twice as high as the endowments of the other two group members. In the homogenous groups, everyone has the same endowment as the low-endowment players in the heterogeneous groups. They do not find much effect on inequality, but the possibility to punish free riders plays a key role. In particular, they find that without punishment, there is a ubiquitous trend towards free riding regardless of the group type. When punishment is possible, contributions are high in both group types. Importantly, they find that

punishment behavior is consistent with enforcing a norm of proportional contributions in the presence of inequality. Hauser et al. (2021) mirror the result by showing that when inequality is visible, individuals are sensitive to people's ability to contribute. Interestingly, according to a companion survey in Reuben and Riedl (2013), this is different from the norm an impartial spectator finds appealing. Uninvolved subjects find that efficiency matters, and everybody should contribute the whole endowment.

In Maurice et al. (2013) the optimal investment for the private account is fixed. Thus, the higher the endowment, the more an agent would invest in the public account as an optimal strategy. Participants either receive the same endowment or randomly receive different endowments with known distribution. In the presence of inequality, the rich contribute more while the poor contribute less, both in absolute terms and in relative terms, as prescribed by the Nash equilibrium. As a result, they find inequality has no effect on cooperation. Notice again that, by design, investing more (less) in the public account is optimal when one has a higher (lower) endowment.

Fung and Au (2014) introduce three levels of endowment (high vs. medium vs. low) and three types of distribution, homogeneous versus heterogeneous (each participant receives a different endowment) versus hegemonic (two participants receive the same lower endowment than the third participant). The total endowment as a group is fixed across treatments. Participants know their own endowment and that of their group members. Results show that contributions are significantly higher in the homogenous groups than in the heterogeneous and hegemonic groups.<sup>14</sup> As endowment inequality increases, there is a larger decline in cooperation in heterogeneous groups than in hegemonic groups. The result is consistent with the social identity model, which predicts that individuals with lower endowment under hegemonic conditions are less likely to experience a diminishing group identity because there is always another agent with the same income. In the heterogeneous group, on the other hand, individuals tend to form personal identities, and thus become more self-focused. Furthermore, as inequality increases, people with the highest endowment contribute lower proportions in heterogeneous groups, but not in hegemonic groups, possibly because of the greater temptation to free-ride in heterogeneous groups (middle-income can/should also contribute).

Nishi et al. (2015) design a networked dynamic public goods game in which subjects interact with each other with or without observing the wealth of their neighbors for 10 rounds. Participants ( $N = 1462$ ) are randomly embedded within social networks with low, medium, or high inequality (Gini coefficient = 0.0, 0.2, or 0.4) generated by varying initial endowments. Subjects play a cooperation game with five neighbors. In each round, they decide whether to spend fifty tokens and increase the wealth of all their neighbors by one hundred tokens or to free-ride. After making their decision, they are informed about their neighbors' decisions. In the experiment, the level of initial inequality is negatively associated with overall wealth, suggesting that inequality has detrimental effects on cooperation. The visibility of wealth inequality exacerbates the problem: it enhances inequality, and it has negative consequences on the inter-connectedness of the network, the levels of overall cooperation, and thereby on the final wealth in the network.

Hargreaves Heap et al. (2016) go a step further and design an experiment to disentangle the effect of inequality on cooperation from the effect of absolute wealth. To test for the pure effect of inequality, controlling for individual endowment, they compare the contributions of subjects with the same endowment in the equality and inequality conditions. They find that individuals with low and medium endowments contribute the same in relative terms in the inequality condition and the equality condition. The rich, however, contribute less in relative terms under inequality. This behavior drives down the overall contribution to public goods in the presence of inequality. The finding suggests that the rich are more afraid of being free-ridden than the others.

In Camera et al. (2020), inequality arises endogenously in the so-called “helping game”. The game consists of a “donor” who is endowed with a good and a “recipient” who values the good more than the donor. The donor can either transfer the good to the recipient (cooperate) or consume the good (defect). The recipient has no endowment and no action to take. The donor’s dominant action is to defect. Cooperation (always donate) is not mutually beneficial, but it maximizes surplus in the pair, and it is the most efficient outcome of the “economy”. The sequence of the “helping game” is indefinite and roles are randomly assigned in each round. As a result, in the long run, earning potentials are the same for each subject (equality of opportunity). At the round level, however, there is a superior earning potential for the recipient, thus inequalities in past economic opportunities may exist if some participants are assigned to the role of recipients more frequently than others. The authors find that inequalities in past opportunities affect long-run cooperation. Participants condition their donations on their past opportunities, donating less when they had few favorable opportunities in the past. They also donate less to those who are better off in terms of wealth (even if they do not know their past opportunities), and to those who had better opportunities in the past (even if they do not know their wealth). Finally, participants are willing to sacrifice future gains to counteract unfavorable past opportunities when others’ wealth can be clearly attributed to past roles.

Like Sadrieh and Verbon (2006), Gächter et al. (2017) are also interested in whether inequality affects growth (via cooperation), measured by the total wealth the players possess over time. In other words, agents’ social output today determines the production possibilities tomorrow. In Gächter et al. (2017), a standard linear public goods game is employed, with or without the possibility to punish free riders. The Nash equilibrium prescribes zero contribution in the standard linear public goods game, unlike Sadrieh and Verbon (2006)’s model. Another main difference with Sadrieh and Verbon (2006) is that players start off equally in Gächter et al. (2017). Thus, inequality arises endogenously as subjects progress in the game while making different choices in public goods contribution. Over time, the average Gini coefficient increases from zero to approximately 0.2 in the last period. Wealth also grows steadily, as players continuously increase the absolute amount contributed to the public account before the last few periods due to the end-of-game effect. They find that inequality in early periods is strongly negatively correlated with total wealth in the last period, especially in treatments with punishment, indicating a detrimental effect on social cooperation. Using additional treatments where they eliminate inequality by redistributing earnings at the beginning of each period, they explicitly show that inequality is negatively associated with cooperation.

Paetzl and Traub (2017) employ a non-linear one-shot, 3-person public goods game<sup>15</sup> and show how inequality, measured by skewness, affects social preferences. They systematically vary the distribution of endowments across treatments to have perfectly equal, left-skewed (two rich, one poor) right-skewed (one rich, two poor), and symmetric endowments. The assignment of endowments is determined by individuals’ cognitive ability. They find that cooperation and efficiency are lowest with the right-skewed distribution of endowments. Notably, despite having inequality, the left-skewed distribution achieved the highest cooperation and efficiency. The fitted Charness and Rabin (2002)’s social preference model reveals that the rich are most (and pure) selfish in the right-skewed treatment and least selfish in the left-skewed distribution. The results, according to the authors, can be explained by social distance: the rich act more selfishly when the social distance becomes larger, which is operationalized via the skewness of endowment distribution.

Martinangeli and Martinsson (2020) study how inequality-induced social identity affects cooperation. Participants are members of two local public good provision groups, and they receive two non-transferable endowments of equal size, one for each group that they belong to. The size of the

endowments is randomly determined to be either high or low. There are two treatments: “unequal society” where an individual can be relatively rich (poor) in one group (heterogeneous group) and equally well-off in the other group (homogeneous group); “equal society” where everyone is equally well-off. The results show that the overall contributions to public goods are lower in the unequal society than in the equal society, though the difference is not statistically significant. More specifically, they find that in both homogeneous and heterogeneous groups of the unequal society, poor subjects contribute the same proportion as subjects in the equal society. However, rich subjects contribute a significantly lower proportion of their endowment in heterogeneous groups in the unequal society than subjects in the equal society while they do not reduce their contribution in homogeneous groups (that is, cooperation remains high when interacting with other well-off individuals). In absolute terms, the rich do *not* contribute less than the poor.

Markussen et al. (2021) conduct a lab-in-the-field public goods experiment with over 1300 participants across rural Vietnam. These areas are characterized by distinct levels of corruption and the authors examine whether inequality has a greater negative effect in more corrupted regions. They find that inequality has a detrimental impact on overall contributions as those with high endowments contribute a much smaller portion compared to those with low endowments. This detrimental effect on cooperation is even more pronounced in areas with elevated levels of corruption. This is because people who live in highly corrupted areas are more pessimistic about others' contributions in the presence of inequality.

## GENEROSITY AND PROSOCIALITY

Côté et al. (2015) experimentally test the effect of inequality on generosity by conducting an online experiment. Subjects are randomly assigned to two conditions that vary in terms of induced perception of inequality. Individuals who have a higher household income do not on average give more to strangers in a dictator game. Hence, there is no correlation between income and generosity. On the other hand, if high-income individuals believe that income inequality is high, they become less generous than in a situation where inequality is believed to be low. According to the authors, this is due to the rich's sense of entitlement. When realizing that inequality is high, the rich view themselves more favorably than the general population and believe that resources rightfully belong to them. Côté and Willer (2020) report a preregistered direct replication study of Côté et al. (2015). Although they planned sufficient statistical power given the effect sizes found in Côté et al. (2015), they are not able to replicate the original finding: state-level inequality does not moderate the effect of household income on generosity in a dictator game ( $p = .40$ ).

Smeets et al. (2015) study generosity with millionaires in the Netherlands using the dictator game. Each millionaire proposes how to allocate 100 euros between herself/himself and a recipient. This proposal is then implemented for real with some probability. In one treatment, the recipient is another millionaire, while in the other treatment, it is a low-income individual (annual income < 12,500 euros). They find that millionaires donate more to low-income counterparts.

Chiang and Chen (2019) study how inequality affects altruism in a laboratory setting using a dictator game. Prior to the dictator game, participants perform a memory task that requires substantial cognitive effort and skill. The authors employ a  $2 \times 2$  factorial design. The level of inequality can be either high or low; income can either be determined purely by chance or by merit. Importantly, participants choose whether they would like to have the payoffs function for the memory task to be more unequal or equal among participants. Participants are then assigned to the respective treatment with high or low inequality accordingly. The results show that inequality in general decreases sharing in absolute terms. In particular, it decreases the rich's generosity more than the poor's generosity. The rich are more generous in absolute terms unless they

self-select into high-inequality treatment. Individuals in the high inequality treatment are the ones who are more competitive, aiming for a high payoff, and less other-regarding.

Duquette and Hargaden (2021) incentivize participants to make donations to a local real-world charity (but not well-known among participants). The experiment consists of twenty-four rounds with twelve different income distributions, varying the level of inequality. The authors paid two out of twenty-four rounds for real. Subjects know the number of tokens they received and some information about the tokens other people received. In each round, they decide how many tokens they would like to donate to the local charity with various levels of inequality (there is no equality condition). The donation made by subjects per round is matched by the experimenter with various match rates. They clearly find that higher inequality is associated with lower average donation, controlling for the match rate. The authors further investigate the relationship between giving as a percentage of income and endowment. They find a robust U-shape pattern: lower-income individuals contribute a higher share, medium-income individuals the lowest, and rich individuals contribute a higher share. But even controlling for this relative income effect, inequality still shifts down the overall contribution in the experiment.

## ANTISOCIAL AND UNETHICAL BEHAVIOR

### Money burning and sabotage

Zizzo and Oswald (2001)'s study is one of the first money-burning experiments. The experiment consists of a betting stage and a burning stage. In the betting stage, four subjects bet their money for 10 rounds. Two subjects receive a higher endowment in each round than the other two. Therefore, subjects' payoffs not only depend on their own betting decision but also on their per-period windfall endowment. Subjects know the earnings of the other players and their different endowments in the betting stage. In the burning stage, they are given the opportunity to burn other people's money at increasing marginal costs. The authors find substantial anti-social behavior: most of the subjects choose to burn others' earnings. On average, subjects burn half of their total earnings. People burn others' earnings even if this costs them 25% of their payoffs and even if there were no personal monetary gains when burning others' income. Both richer and poorer individuals got their money burnt (perhaps due to retaliation). Zizzo (2003) reports a similar finding using a similar procedure.

In Dawes et al. (2007), subjects can burn or give money to other group members at a cost for five periods with stranger matching. At the beginning of each period, subjects receive a random payoff, and they are informed about the random payoff received by others. They can then decide whether to help or harm other players at their own cost. At the end of each period, they get feedback on the net help/harm received. The authors find that aversion to inequality is strong. Subjects spend a substantial amount of money to alter others' income. Emotions towards top earners become increasingly negative as inequality increases. The intensity of emotions strongly correlates with the effort to make income more equal.

Abbinck et al. (2011)'s experiment also consists of two stages. In the first stage, subjects play a proportional rent-seeking game to share a prize. Subjects are divided into two groups: advantaged and disadvantaged groups. Inequality is imposed exogenously by allowing the advantaged group to gain more rent while exerting the same effort (cost). In the second stage, the two groups can engage in destructive rioting. Members from each group decide jointly, via a coordination game, whether to reduce the payoffs of members of the other group. The rioting outcome is dominated by a peaceful outcome. In the presence of inequality, the authors find that the disadvantaged groups riot significantly more than the advantaged groups. However, interestingly, as inequality looms larger, conflict frequency declines sharply, possibly since after many repetitions subjects realize

that conflict is a dominated outcome. The authors' explanation is that the poor eventually give up as the level of inequality increases.

In Grossman and Komai (2013) the advantaged players (the rich) have a larger per-period endowment and higher expected returns from investing than the disadvantaged players. The authors find that although money burning is frequently observed between the rich and the poor, also within class anti-social behaviors are common. The unjust wealth-generating process seems to fuel envy, which in turn encourages anti-social behaviors.

Fehr (2018) examines how procedural fairness (the fairness of the wealth-generating process) interacts with anti-social behaviors of burning other people's money in the presence of inequality. The experiment consists of three parts. First, participants work on a real-effort task that determines their initial income. They then receive feedback on their own performance, relative performance, income, and bonus (rank) of all group members. Lastly, they enter the burning stage where they can burn up to half of the income of each of the other three group members. The cost for reducing the income of others is fixed at 50 cents, regardless of the burned amount. There are three treatments. There is a piece-rate treatment where the real-effort task does not require any specific skills, thus the income difference between players is small. In a second treatment, the best-performing worker in a group receives a large bonus on top of the piece-rate wage. Finally, the last treatment allows subjects to misreport their performance. He finds that inequality per se does not lead to more money burning. More anti-social activities are observed only when other people may have been involved in morally questionable activities. If the increased inequality can be clearly attributed to effort, there is no increase in anti-social activities.

Gangadharan et al. (2019) further study how a naturally formed social identity (residential college affiliation) interacts with income inequality to influence anti-social behavior. They find that when social identity is unknown, low-income participants are more antisocial towards others, such antisocial behavior is mitigated if they share the same social identity. Beyond intra-class anti-social behaviors, most antisocial behaviors occur when the low-income targets the high-income with a different social identity.

More recently, Bigoni et al. (2021) allow for an even more extreme version of money burning. All subjects can choose to exit the game and thus no one earns any payoffs. They find that when inequality is avoidable (i.e., the rich fail to implement equal payoffs when they can) the disadvantaged players strongly react to inequality. The extreme antisocial behavior of burning all the money is frequently observed.

## Cheating

Gino and Pierce (2009) show that people cheat to reduce inequality. They first pair subjects into dyads and induce inequality through a lottery. One of the two players is then given the opportunity to either over- or under-report the other person's performance in solving multiple anagrams. They find that the rich (poor) help (hurt) the poor (rich) by overstating (understating) their performance to reduce inequality, even if such misreporting comes at financial costs. Through self-reported emotions, the authors find that being poor evokes envy, which leads to hurting behavior, whereas guilt is induced by positive inequity (being the rich), which motivates helping behavior. The underlying mechanism mirrors the finding by Grossman and Komai (2013) who also find that envy is the main reason people would sacrifice personal financial gains to restore equality. In a follow-up study, Gino and Pierce (2010) replicate their 2009 study and further show that the result also holds when people earned their position through merit, rather than a random assignment of the endowment. They again conclude that individuals tend to discount the unethical aspects of the wrongdoing when the action can restore equity, acting as a modern Robinhood.

Houser et al. (2012) study how cheating interacts with fairness. Inequality is induced through a dictator game in the first stage. After the dictator game, subjects get a chance to increase their earnings via a coin flip game for a prize. They find that both proposers (the rich) and recipients (the poor) cheat when given the opportunity. However, not surprisingly, recipients cheat much more frequently than the proposer, especially when they find themselves being treated unfairly in the first place.

Gill et al. (2013) study the effect of inequality in a labor setting. Subjects in their study first work in a real effort task and they are either paid the same income (in the equality treatment) or unequal income through a random bonus that is unrelated to performance. They find that workers in the unequal treatment, regardless of whether they received the bonus or not, cheat more in a subsequent mind game when given the opportunity.

John et al. (2014) show that inequality causes more cheating through social comparison. In their experiment, they have two wage levels, low or high. Whether subjects receive a high or low wage depends on a flip of a coin. In one condition subjects know that there are two levels of wages while in the other condition, they do not. Subjects can misreport the task they finished and earn a higher wage. The authors find that low wage itself does not promote cheating behavior. However, when subjects are aware of other people earning higher wages, social comparison encourages cheating by the underpaid to compensate for lower wages. Thus, when inequality is salient, it promotes cheating.

The effect of social comparison on cheating also emerges outside the laboratory setting: a large experiment reported by Gsottbauer et al. (2022) using German Internet Panel finds that when rich people are aware of their relative position, they cheat much less in a mind game.