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# *The Giver as a General in Her Fortunes. Experimental Evidence on Trust, Inequality and Growth (or Decline)*

**Marcello D'Amato[*], Niall O'Higgins[**] and Marco Stimolo[***]**

**Abstract**
We report the results of a laboratory experiment based on the trust game and designed to assess the impact of economic growth and inequality on trust in a unified framework. Compared to a control with no inequality, we implement three treatments with exogenously induced inequality in environments characterized by growing, stable or falling initial average endowments. We find that trust and trustworthiness both decrease with inequality, and trust (but not trustworthiness) increases with an increase in the average endowment level. Hence, the negative impact of inequality on trust results to be stronger in the environment with falling average endowment, whereas no effect is recorded in the environment with growing average endowment. These aggregate effects are driven by the significant negative reactions to inequality by those who, due to treatment, end up at the bottom of the endowment distribution.

**Keywords**: Trust Game, Inequality, Growth, Decline

**JEL Classification**: C91, D31, D90

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*Sed convivatoris uti ducis*
*ingenium res adversae nudare*
*solent, celare secundae.*

[And then, about the Giver, as
about the General, Adversities
reveal his true nature, whereas
good fortunes conceal it.]

Horatius, Liber II, Satira viii,
73-74

# 1 Introduction

In this paper we study some aspects of the entangled relationships between inequality, growth and generalized trust.[1] Broad conjectures about the relationship between inequality, wealth and trust have long been asserted by proponents of the importance of trust for the understanding of the sociological basis for economic development. Indeed, it is a widely shared presumption in sociology that individual heterogeneity – and particularly income inequality – hampers trust (Putnam 2000).[2] To explain the lack of mutually beneficial cooperation amongst the inhabitants of a town fictitiously called Montegrano (Southern Italy), Banfield and Fasano (1967, p. 168) argued that, among other factors, "The dreadful poverty of the Montegranesi also helped to form their ethos".

A significant literature in recent years has further investigated these issues both at the theoretical level and, more extensively, at the empirical level (see the survey by Algan and Cahuc 2013). A growing body of observational studies have provided cross-sectional evidence of a positive correlation between real per-capita GDP and trust (Knack and Keefer 1997; Zak and Knack 2001; Algan and Cahuc 2013, 2014). Guiso et al. (2009, 2016) deliver historical evidence that generalized trust is amongst the main socio-economic determinants of long-run development. Ananyev and Guriev (2018) build on these results and, by exploring the reverse causal chain, they identify a causal impact of (negative) income shocks on (lower) levels of self-reported trust in Russia during the 2009 economic crisis.[3]

As for inequality, Alesina and La Ferrara (2002) were among the first to document its role in shaping trust and their results have been reinforced by Costa and Khan (2003), Guiso et al. (2009), Algan and Cahuc (2013). Moreover, Banerjee and Iyer (2005) provided historical evidence of how economic inequality works as the transmission channel of the long-run effect on trust of the different revenue collection systems imposed in India during the British

[1] Guiso et al. (2009, p: 1101) define generalized trust as the "trust people have toward a random member of an identifiable group". In other words, generalized trust refers to the members of the society beyond the personal relationships such as family, close friendship and fellow workers.

[2] As Putnam (2000, p. 391) points out, "By the end of the twentieth century the gap between rich and poor in the United States had been increasing for nearly three decades, the longest sustained increase in inequality in at least a century, coupled with the first sustained decline in social capital in at least that long".

[3] Specifically they find that a 10% decrease in aggregate income induce a 5% decrease in generalized trust. This is consistent with findings in Algan and Cahuc (2013) where, in a cross-country regression, one standard deviation in income is found to increase trust by 6% of its sample mean.

domination.[4]

Few contributions to the empirical assessment of the causal impact of inequality on trust have been based on laboratory experiments. However, the impact of inequality on trust has not been supported (or at best mildly so) by recent experimental investigations. In a few cases no effect of exogenously induced inequality on trust has been recorded (Anderson et al. 2006), while Hargreaves Heap et al. (2013) have found only mild evidence for the causal impact of inequality on trustworthiness but not on trust. Importantly, to date there have been no controlled laboratory experiments evaluating the effects of shocks to the aggregate endowment of participants on their trusting behaviour. Our contribution here is to report new evidence from a controlled experiment on the relationships between growth, inequality and trust in a unified experimental framework.

In order to arrive at a clear formulation of our design consider that, in evaluating the impact on trust of economic inequality and growth, the latter cannot be thought of as independent phenomena, especially if the assessment regards the role of trust in economic development. As Kuznets (1973, p. 252) long ago pointed out, "Economic growth perforce brings about a decline in the relative position of one group after another [...]. The continuous disturbance of preexisting relative position of the several economic groups is pregnant with conflict despite the rises in absolute income or product common to all groups". His statement pertains to the relationship between growth, inequality and "conflict" among groups. An identical argument, we think, holds regarding "trust". Put differently, changes within the distribution of income or wealth are a consequence of the process of economic growth (or decline) and they may affect the sociological basis of development in terms of distributional conflict or trust. We build on this view: intuitively, people in different groups of the income distribution may behave differently in a growing society compared to a society in recession. Hence, we deem as an important step the collection of lab evidence about individual reactions to inequality when the latter is brought about by growth or decline of aggregate endowment.

Taking this view to the lab presents us with the conceptual challenge of disentangling the impact on trust of shocks to aggregate endowment from the analogous, but distinct, impact of shocks to inequality. To pursue this aim, we employ a design, summarized in the following thought experiment. Imagine a big city, where inhabitants know that they all possess the same initial wealth and take part in one-shot anonymous economic interactions like the trust game (Berg et al. 1995), whose outcome depends on the level of trust and trustworthiness among them. Imagine the original city is partitioned into three new cities inhabited by randomly chosen individuals from the original one. These cities all exhibit the same level of inequality (as measured by the variance) of initial endowment but they differ by the average endowment level. In each of the three cities individuals are assigned to one of three different groups according to the level of their initial endowment: poor, middle class, rich. In the first city, aggregate wealth is larger compared to the original one (growth), in the second one the aggregate wealth is maintained at the same level as in the original city (steady state), in the third city aggregate wealth is smaller (decline). All inhabitants in all cities know the distribution of the individual endowments in the city they live in. Then, they anonymously

[4]Specifically, the authors showed that those revenue systems entailing a higher level of economic inequality, exacerbated the conflict between masses and elites, thereby determining their inability to cooperate to take advantage of the public investments in the rural areas in the 1965-1980 period. As Banerjee and Iyer (2005, p. 1198) clearly claim, "it is no surprise that the elite and the masses in these areas rarely shared the trust that is essential for being able to act together in the collective interest".

interact with their fellows within their own city following the protocols of a trust game. As a result, in each of the three cities, each individual knows that, compared to the original city (in which they all had the same endowment), each and all of them will anonymously interact with partners belonging to three different groups.

Should we expect lower levels of trust and trustworthiness in each and all of the three cities and on average compared to the original one because of inequality (within-subject analysis)? Should average endowment growth (decline) in the first (third) city induce a higher (lower) levels of trust and trustworthiness (between-subject analysis)?

To address these questions, we designed a lab experiment enshrining the essential features of the aforementioned thought experiment. Students at a large Italian University were asked to play two trust games with random and anonymous matching without replacement. Since participants were not informed of the monetary consequences of their choices in the two games (and hence on the behaviour of their counterpart) our design controls for this specific source of strategic biases and learning effects, thereby strictly abiding to one-shot anonymous interactions to elicit individuals' trust. These features have been specifically designed to elicit behaviour prompted by general attitude towards trust as measured in observational studies referred above.

In the baseline there is no inequality, so all subjects get the same endowment (i.e. 25 tokens = 7.5 euros) and play a trust game. Subsequently, subjects are randomly assigned to three treatment groups and play a further trust game. Treatments are made of exogenous shocks to the individual endowment, and hence to the overall endowment distribution. Specifically, we exogenously change endowments so as to induce the same level of inequality in all treatments: i.e. the distribution of initial endowments has the same variance in each treatment. Treatment 1 (growth) features an increase of initial aggregate endowment by 20%, treatment 2 (steady state) features the same initial aggregate endowment as in the control, treatment 3 (decline) features a reduction of initial aggregate endowment by 20%.

Subjects, of course, knew their own endowment both in the relevant control and in the treatment. Importantly, they were also made aware at the outset of all shocks to the endowment distribution in each of the possible treatments. Hence the overall endowment distribution in the environment where they would end up playing the trust game can be considered public information. By anonymity, however, they did not know the endowment of their specific counterpart in the game.

In the baseline, we find that senders and receivers give 40% of their endowment on average. In line with Putnam (2000)'s conjecture and with the evidence provided by observational studies, in treatment 2 (steady state) we find that inequality reduces trust by 11% and trustworthiness by 18%.

The effect of inequality on trust turns out to be different across economic contexts (within-subject analysis). Indeed, no effect on average trust is recorded in treatment 1 (growth) compared to the control. Conversely, a strong negative effect of inequality on trust of −11% is recorded in treatment 3 (decline) compared to control. All of the average treatment effects are the aggregate consequence of heterogeneous responses by sub-groups, in particular by those who lose out in the redistribution of endowments. In contrast, there are no statistically significant differences in trustworthiness amongst receivers across the three economic contexts, where the average treatment effect on trustworthiness is −19%.

As for the impact of growth on trust, we identify a positive causal effect consistently with the above-mentioned attitudinal studies. By comparing the average treatment effects in the

between–subject analysis we find that in treatment 1 *vs* treatment 3 exogenously induced growth (+40%) of the aggregate endowment increases trust by 15% on average. Hence, in comparison with other studies on these issues, in our experiment endowment growth positively affects trust so as to offset the negative effect of inequality. Consistently, the reduction of aggregate endowment reinforces the corrosive effect of inequality on trust. Conversely, we do not find any effect of exogenously induced growth on trustworthiness. Again, these results are primarily driven by changes in the response of those subjects ending up at the bottom of the endowment distribution.

In short, in our controlled lab experiment generalized trust decreases with inequality among subjects, whereas it increases with the aggregate level of the endowment. Trustworthiness decreases on average with inequality, but it does not change with the aggregate endowment level. The reported average treatment effects are driven by the negative reactions to inequality by those at the bottom of the endowment distribution after treatment, especially in the environment of decline.

These results are important because they provide lab evidence that, unlike previous experimental studies, is clearly consistent with observational studies both on the impact of inequality on trust and on the impact of growth on trust. In this respect we provide additional motivation for the importance of a theoretical effort on the study of the determinants of trust, especially if its dynamics is to be included among the relevant sociological factors of development. Specifically, the results from our lab experiment call for a focus on the behavioural reaction by those who end up at the bottom of the wealth distribution because of the changes induced by growth shocks.

In what follows, section 2 describes the experimental design. Section 3 reports the results of the control session. Section 4 provides the results of the effect of inequality. Section 5 illustrates the effect of inequality in the three environments of growth, steady state and decline. Section 6 concludes. Appendix A reports results from a regression analysis synthesizing our experimental results. A discussion of induced ex-post inequality is contained in Appendix B. A full description of the instructions (translated from original Italian) is provided in Appendix C.

# 2 Experimental design

A sample of 144 undergraduate and master students from the University of Salerno (Italy) took part in a trial run at the laboratory CATI of the Department of Sociology of the same University in June 2016. Potential subjects were randomly drawn from the database of the University of Salerno. They were invited via e-mail to sign up to the Hroot website (Bock et al. 2014) managed by the LABSI of the University of Siena. The recruitment for the experimental sessions followed two simple selection criteria: first, subjects had no experience of economic experiments; second, the random sampling procedure had to balance gender and fields of study. Then, subjects were randomly assigned to a specific experimental session. The trial was designed as a computer-based experiment managed by a z-tree script (Fischbacher 2007). Subjects were randomly assigned to computer slots that were completely isolated to guarantee full anonymity. Moreover, they were not allowed to talk during the session and lab assistants checked for compliance.

The design included two standard trust games (Berg et al. 1995). An initial endowment

was attributed to players at the start of each game. This endowment, however, could not be transferred across the two games. As a control, in the first trust game all subjects received the same endowment, while in the second one inequality was exogenously induced by changing their initial endowments[5]. To guarantee full anonymity, in each game subjects were randomly and anonymously matched without replacement.

In this setting, subjects did not know at the outset the kind of the behavioural tasks they would be asked to accomplish. This means that subjects received the instruction for each task separately. This informational restriction allows us to control for the strategic bias that would arise when subjects are fully informed on the nature of subsequent behavioural tasks and on the number of iterations. Moreover, subjects got paid at the very end of the experiment, when one of the games was randomly selected as payoff relevant and subjects came to know of the behaviour of their counterpart. Hence, we control for learning effects as subjects could not discern the average level of trust and trustworthiness in the experimental sample.[6] These features make the informational conditions of our design similar to those ones of the survey measures of trust. This allowed us to elicit the behavioural implications of subjects' general attitude towards trust as measured in the observational studies referred above. In this sense, our design is different from the one of Anderson et al. (2006) and Hargreaves Heap et al. (2013), based on a repeated trust game with random and anonymous matching, where subjects were informed on the number of rounds and on the behaviour of their counterpart in each round.

In the two one-shot anonymous trust games implemented in our experiment, senders could choose to give any discrete amount between 0 and 10 tokens (1 token = 0.30 euros); hence, the amount subjects could give was the same across treatments. This guaranteed full comparability across senders' average level of transfers as the exogenous shocks imposed on their endowment in the treatments did not restrict the space of feasible transfers. Receivers' choices were elicited with the strategy method: the receiver declared the integer fraction of the received amount she would be willing to give back for any positive amount (from 1 to 10 tokens) the sender could decide to give to her. Hence, the receiver's actual choice was conditional on sender's unknown decision. Two reasons motivated us to implement the strategy method. First, it allowed us to control for the level of inequality determined by the choice made by each sender. Thus, we have been able to measure the impact of exogenously induced inequality on trustworthiness in a more precise way than otherwise. Second, the strategy method allowed reconstructing receivers' return function. Hence, we have been able to measure the impact of inequality not only on the average level of trustworthiness but on the whole schedule of the returned amount. This is important for comparing our results with those from other studies in this area (Xiao and Bicchieri 2010).[7]

The experiment was organized in two phases. In PHASE 1, subjects were randomly as-

[5]The dataset of the experimental sessions is provided as supplementary electronic material, which is available at `https://drive.google.com/open?id=1T64Abw7N_Becy5B9fSIH5FrSshEBxF1_`.

[6]This procedure also controls for subjects' social concern for others' judgments about their own choices, possibly involving other-regarding motivations (i.e. motivations concerning one's own and others' material payoffs). As shown in Charness and Gneezy (2008), other-regarding choices are sensitive to the informational conditions in the lab.

[7]It might be objected that the strategy method can bias receivers' choices because the simple hypothesis on sender's level of transfer may have different behavioural and emotional implications compared to the information on the actual choice from the sender. However, Johnson and Mislin (2011)'s meta-analysis does not provide evidence of significantly different choices from receivers elicited either with the strategy or the direct method. This result is confirmed by Di Bartolomeo and Papa (2016).

signed to the role of sender or receiver, which remained fixed throughout the experiment. Then, subjects were asked to play a trust game ($TG_c$) where the mean initial endowment $e_c = 25$ tokens (7.5 euros) was equally distributed. This constituted our control ($\text{City}_0$) that allowed measuring the average level of trust and trustworthiness in conditions of endowment equality. In PHASE 2, subjects were randomly assigned to three treatments groups (i.e. $\text{City}_i$, $i = 1, 2, 3$), where they played a further trust game with random and anonymous matching. Subjects knew only that they were interacting with a different person than before. We denote with $\text{TG}_t$ the trust game in the treatment groups, with the $i$ subscript in $\text{TG}_{ti}$ denoting the specific trust game design in each treatment group.

The treatments consisted of an exogenous shock to individual initial endowments. At the outset, in each treatment group subjects were announced that they would have been randomly assigned to three sub-groups differing in their initial endowments.[8] In the following we denote as *poor* the sub-group A of subjects in the lower tertile of the endowment distribution, as *middle-class* the sub-group B of subjects of the median tertile in the endowment distribution, as *rich* the sub-group C of subjects in the top tertile of the endowment distribution.[9]

As a result of the above design we take for granted, therefore, that individuals knew their own endowment and the whole distribution of endowments in their city after treatment, but not the specific endowment of their counterpart.

As a consequence of the perturbation of the individual endowment, aggregate endowment changed across treatments (i.e. $\text{City}_i$, $i = 1, 2, 3$). In $\text{City}_1$ (growth), the mean initial endowment grew compared to $\text{City}_0$ by 20%: $e_c = 25 < e_{t1} = 30$; in $\text{City}_2$ (steady state), the mean initial endowment was held constant compared to the control ($\text{City}_0$), but it was redistributed among players; in $\text{City}_3$ (decline), the mean initial endowment declined by 20% compared to $City_0$: $e_c = 25 > e_{t3} = 20$. Table 1 summarizes the main characteristics of control and treatment groups.

[8] In the instructions submitted after the control had been played, subjects were informed about the endowment of the three sub-groups in each treatment group.

[9] The names of the sub-groups are here used for the sake of exposition, whereas in the experiment only neutrally framed information on the economic context was provided, avoiding any wording or phrasing with a normative content.

Table 1: The endowment distribution in the control and treatment groups

| Treatments | Subjects | Mean Aggregate Endowment | Sub-group A (1/3) Poor | Sub-group B (1/3) Middle Class | Sub-group C (1/3) Rich |
|---|---|---|---|---|---|
| $City_0$ Control | 144 | $e_c = 25$ | - | - | - |
| $City_1$ Growth | 48 | $e_{t1} = 30$ | 25 (No variation) | 30 (+ 5 tokens) | 35 (+ 10 tokens) |
| $City_2$ Steady State | 48 | $e_{t2} = 25$ | 20 (– 5 tokens) | 25 (No variation) | 30 (+ 5 tokens) |
| $City_3$ Decline | 48 | $e_{t1} = 20$ | 15 (– 10 tokens) | 20 (–5 tokens) | 25 (No variation) |

NOTE: 1 token = 0.30 euros, $City_i$ ($i$ = 1, 2, 3) stands for treatment group $i$ to which subjects are randomly assigned. $e_{ti}$ and $e_c$ denote the mean of the endowment distribution in treatments and control, respectively. The three sub-groups (poor, middle class and rich) indicate subjects' relative position within the endowment distribution after treatment, respectively, bottom, median and top tertile.

Notice that in all cities, the endowment distribution was symmetric with identical variance (19.15). Thus, the level of inequality among individuals of different sub-groups was, in this sense, held fixed across cities. Let us denote with $F(e_{ti})$ and $F(e_c)$ the distribution functions of the random variable $e$ in the treatments and control respectively. Notice that $F(e_{t2})$ has the same average as $F(e_c)$, but the latter dominates the former in the sense of second-order stochastic dominance. Moreover, it holds the following relation of first-order stochastic dominance: $F(e_{t1}) \succeq F(e_{t2}) \succeq F(e_{t3})$. Aggregating across all cities ($\overline{\text{City}}$), the distribution function $F(e_{\overline{\text{City}}})$ has the same average as $F(e_{t2})$, but a higher variance (35.66).[10]

As in Anderson et al. (2006) and Hargreaves Heap et al. (2013), the effect of inequality is measured by inducing a *mean preserving spread* of the endowment distribution in $City_2$ (steady state). As a robustness test, in $\overline{\text{City}}$ (all cities) we can measure the effect of inequality in a context where initial endowments are heterogeneous within each sub-group (poor, middle class, rich).

The effect of the exogenous shock to the aggregate initial endowment was measured by inducing a *variance preserving shift* of the endowment distribution across treatments. Specifically, we hold fixed the variance of the distribution of initial endowments across cities, while determining a controlled variation of their mean. Thus, the average treatment effects in $City_1$ (growth), - where $e_{t1} = 30$ - and in $City_3$ (decline) - where $e_{t3} = 20$ - compared to the control measure the overall effect of inequality and of the change in the aggregate endowment (within-subject measure). Instead, the difference between the average treatment effects in $City_1$ (growth) and $City_3$ (decline) measures the effect of growth on trust and trustworthiness (between-subject measure).

[10]This design exploits both within and between-subject changes in behaviour. We focus on the within-subject changes in behaviour between each treatment ($TG_{ti}$) and control ($TG_c$). Then we compare these within-subject changes in behaviour across treatments. This allows us to reduce the variance of the subject-specific unobserved component, so that the estimate of the average treatment effect is more precise (List et al. 2011, Charness et al. 2012).

# 3 Results on control: uniform endowment

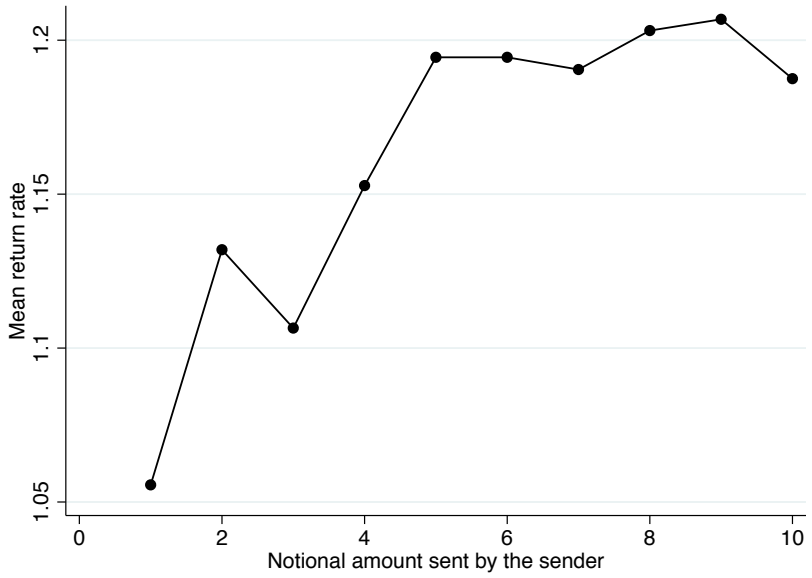
The analysis of the trust game ($TG_1$) in the control ($City_0$) allows us to compare the average behaviour of our sample with average behaviour in the extensive experimental literature on the trust game.

The measured variable for trust is senders' giving rate, defined as the fraction of the maximum amount of endowment that can be disposed of (i.e. 10 tokens) and that the senders choose to give to the receiver. Senders give 41% of their usable endowment on average. This is slightly below the average (modal) giving rate of 50% reported in Johnson and Mislin (2011)'s meta-analysis. However, given the high variability of senders' behaviour found across studies, we do not consider this as an issue of concern. Indeed, Johnson and Mislin (2011) report the average giving rate of 40% as the second most frequent outcome across studies.

Analogous results hold for receivers, who, on average, return 38% of the amount received from the sender. This result is very similar to the average return of 37% reported in Johnson and Mislin (2011). Moreover, the analysis of receivers' behaviour allows an assessment of whether senders' trust is financially justified. The measured variable is the average return rate, defined as the amount sent back by receivers divided by any amount senders may give. Through the strategy method, we can reconstruct the whole schedule of receivers' return rate as a function of the notional transfers from the sender.

Figure 1 shows that the observed baseline return rate in our sample has the same general features in magnitudes and shape as in the rest of the literature. Specifically, it shows that senders' trust provides some potential gain (16% on average) from the transaction because the function of the average return rate is above the break-even point of one. Moreover, the mean return rate is increasing in the level of notional transfers from the sender.[11]

Figure 1: Mean return rate as a function of the notional transfers from sender.




[11]Notice that the fall in the mean return rate at 2 tokens recorded in Figure 1 has been tested as not significantly different from zero.

Thus, trusting and trustworthy behaviour in our sample is consistent with trusting/trustworthy behaviour in other samples analysed in the experimental literature. This supports the notion that the effects of exogenously induced inequality and of the change in initial aggregate endowment found here are more generally applicable. In the following section measured effects of the treatment are reported.

# 4 Treatment effects of inequality

As discussed in section 2, the effect of inequality is measured by inducing a mean preserving spread of the endowment distribution as in Anderson et al. (2006) and Hargreaves Heap et al. (2013). In this section we report the average treatment effects of exogenously induced inequality on giving and return rate in $City_2$ (steady state) and in all cities aggregated all together ($\overline{City}$) as a robustness test. Our results are comparable with the evidence of a negative correlation between economic inequality and generalized trust reported in attitudinal studies (Alesina and La Ferrara 2002; Costa and Khan 2003; Guiso et al. 2009; Algan and Cahuc 2013).

## 4.1 Treatment effects of inequality on trust

Table 2 shows the average treatment effect of exogenously induced inequality on senders' average giving rate in $City_2$ (steady state) and $\overline{City}$ (all cities).

Table 2: Treatment effects of inequality on trust ($City_2$ and $\overline{City}$)

| Average Treatment Effect on Giving Rate | $City_2$ | $\overline{City}$ |
|---|---|---|
| All sub-groups | $-0.108^{*}$<br>(0.082) | $-0.061^{**}$<br>(0.012) |
| Sub-group A<br>Poor | $-0.155^{**}$<br>(0.020) | $-0.144^{***}$<br>(0.000) |
| Sub-group B<br>Middle Class | −0.133<br>(0.674) | −0.055<br>(0.482) |
| Sub-group C<br>Rich | −0.044<br>(1.000) | 0.018<br>(0.435) |

NOTE: Wilcoxon signed ranks test. Two-tailed p-values are in parentheses.

Table 2 summarizes our first important set of results: inequality is detrimental to trust, mostly because of changes in behaviour of those who are most disadvantaged in the treatment (poor).

Since no statistically significant differences emerge between the average treatment effects in $City_2$ (steady state) and $\overline{City}$ (all cities), these results are amenable for a joint comment. As can be seen in the first line of table 2, the average treatment effects both in $City_2$ and $\overline{City}$ are small albeit significant: i.e. all the sub-groups of senders taken together reduce their giving rate by 11-6% compared to the control. Hence, in contrast to Anderson et al. (2006) and Hargreaves Heap et al. (2013), we show that induced inequality clearly reduces the probability

of trusting behaviour. These findings are in line with the results of econometric analyses of survey data (Alesina and La Ferrara 2002, Costa and Khan 2003 and Algan and Cahuc 2013), which report an average negative effect of income inequality (as measured by the Gini coefficient) on subjects' generalized trust of approximately 9%.

As can be seen in the second line of table 2, the average negative effect is driven by poor senders, which are the only sub-group significantly reducing their average giving rate - by approximately 15% - compared to the control.[12] This negative effect is stronger than the one reported in Anderson et al. (2006) and Hargreaves Heap et al. (2013). However, it is consistent with Alesina and La Ferrara (2002) who find financial misfortune to be the variable with the strongest association with lower levels of trust. Senders in the middle class reduce – albeit not significantly – their average level of trust in the treatment, while the rich do not exhibit any significant change in behaviour compared to the control. These results from table 2 are summarized in the following finding:

**Finding 1.** *On average poor reduce the giving rate by 14% across all cities compared to the control (within subjects).*

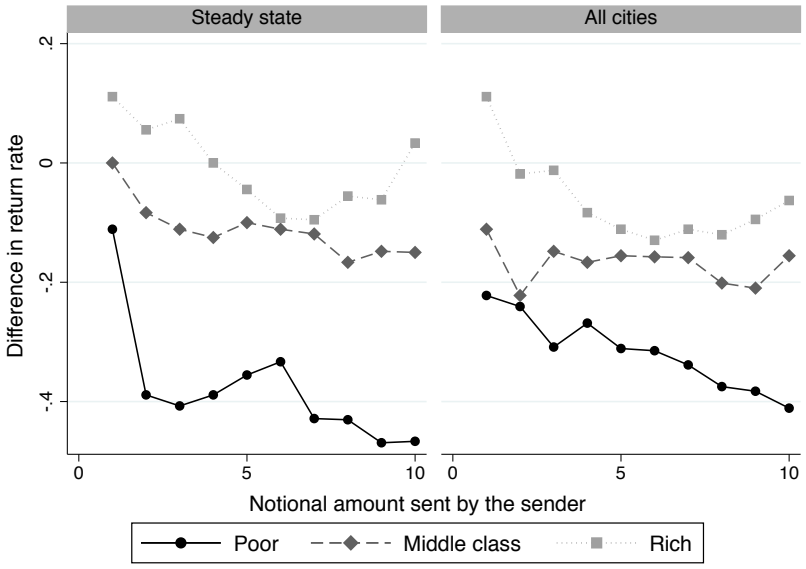
## 4.2 Treatment effects of inequality on trustworthiness

We turn now to the impact of inequality on trustworthiness. Figure 2 plots the graphs of the mean difference in return rate between $\text{City}_2$ (steady state), $\overline{\text{City}}$ (all cities) and the control as a function of the notional transfer from the sender, sorted by sub-groups. This allows us to measure the impact of exogenously induced inequality on the overall schedule of the amounts returned to senders.[13]

[12]The comparison of the offers distributions of poor senders between treatment and control shows that the lower average level of offers is mainly due to the higher frequency of senders choosing the sub-game perfect Nash-equilibrium offer of zero tokens.

[13]The analysis here proposed is not meant to be a direct test of the hypothesis of reciprocity, which requires to take into account receivers' beliefs on the level of transfer from the sender (see Rabin 1993).

Figure 2: Effect of inequality on receivers' return function ( $City_2$ and $\overline{City}$)




Both in $City_2$ (steady state) and in $\overline{City}$ (all cities), all the functions plotted are almost always negative; hence, there is preliminary evidence of a negative effect of inequality on the average return rate from the receivers. Moreover, the function of the mean difference in return rate from the poor (sub-group A) exhibits the steepest slope compared to the middle class and the rich. Hence, due to inequality, the higher is the level of notional transfer from the sender, the bigger is the fraction of the received amount that the poor keep for themselves compared to the control.

Table 3 shows the average treatment effect of exogenously induced inequality on receivers' return rate in $City_2$ (steady state) and in $\overline{City}$ (all cities). Since the strategy method delivers 10 non-independent observations for each player, we first compute the median return rate specific for each subject and then we run Wilcoxon signed ranks tests to measure the average treatment effect.

Table 3: Treatment effects of inequality on trustworthiness ($City_2$ and $\overline{City}$)

| Average Treatment Effect on Return Rate | $City_2$ | $\overline{City}$ |
|---|---|---|
| All sub-groups | −0.181** (0.016) | −0.189*** (0.000) |
| Sub-group A Poor | −0.358** (0.017) | −0.287*** (0.001) |
| Sub-group B Middle Class | −0.128 (0.388) | −0.184* (0.068) |
| Sub-group C Rich | −0.040 (0.661) | −0.095 (0.362) |

NOTE: Wilcoxon signed ranks test. Two-tailed p-values are in parentheses.

In line with the findings on senders, the results from table 3 identify a significant negative impact of inequality on the return rate from receivers, which is mainly due to the negative behavioural reactions by the poor.

Consistently with *finding 1*, the negative impact of induced inequality both in $City_2$ (steady state) and $\overline{City}$ (all cities) becomes stronger as receivers' relative position worsens. Specifically, the overall effect is negative for all sub-groups, however poor receivers (sub-group A) exhibit the strongest and most significant negative reaction to exogenously induced inequality compared to the other sub-groups as they substantially reduce the mean return rate of 36-29%. These results are markedly different from the ones reported by Anderson et al. (2006) and Hargreaves Heap et al. (2013), which do not find any significant treatment effect on trustworthiness when subjects' endowment is not common knowledge. The following finding summarizes the results reported in table 3.

**Finding 2.** *On average poor reduce the return rate by 29% across all cities compared to the control (within subjects).*

# 5 Treatment effects of inequality in the environment of growth *vs* decline

In this section, we first report senders' and receivers' average change in behaviour in each City (within-subject analysis) so as to provide evidence of the overall effect of exogenously induced inequality and of the shock to the initial aggregate endowment in $City_1$ (growth) and $City_3$ (decline). Then, we report the difference in the average treatment effects between $City_1$ and $City_3$ (between-subject analysis) to provide evidence of the effect of growth *vs* decline on trust and trustworthiness. This allows us to compare our results to the evidence on the positive relationship between real per capita GDP and trust provided in observational studies (Knack and Keefer 1997; Zak and Knack 2001; Dearmon and Grier 2009; Ananyev and Guriev 2018).

## 5.1 Treatment effects of inequality on trust in the environment of growth *vs* decline

Table 4 shows the within-subject changes in behaviour between treatments and control, sorted by senders' cities and sub-groups.

Table 4: Treatment effects of inequality on trust in different growth environments

| Average Treatment Effect on Giving Rate | $City_1$ (Growth) | $City_2$ (Steady State) | $City_3$ (Decline) |
|---|---|---|---|
| Effect due to | Inequality + Growth | Inequality | Inequality + Decline |
| All Sub-groups | 0.037<br>(0.451) | −0.108*<br>(0.082) | −0.112***<br>(0.003) |
| Sub-group A<br>Poor | −0.078*<br>(0.084) | −0.155**<br>(0.020) | −0.200***<br>(0.012) |
| Sub-group B<br>Middle Class | 0.100<br>(0.425) | −0.133<br>(0.674) | −0.133<br>(0.140) |
| Sub-group C<br>Rich | 0.111*<br>(0.050) | −0.044<br>(1.000) | −0.011<br>(0.566) |

NOTE: Wilcoxon signed ranks test. Two-tailed p-values are in parentheses.

In all cities, the effect of inequality is clearly negative as the senders' state worsens from rich to poor. Moreover, for all the sub-groups of senders, inequality strongly reduces trust as the economic context shifts from growth to decline.

Aggregating across all sub-groups, the first line of table 4 shows that the overall effect of inequality and of the change in aggregate initial endowment induces senders not to change their average level of trust in $City_1$ (growth) compared to the control, while in $City_3$ (decline) senders exhibit a clear negative reaction to the treatment.

Disaggregating across sub-groups, we observe analogous behavioural patterns. Specifically, poor senders (sub-group A) significantly reduce trust in all cities, but they reduce trust in the growth environment (−8%) less than they do in the steady state (−15%) and decline environment (−20%). Moreover, middle class and particularly rich senders increase their level of trust in the growth environment only. The OLS regressions reported in table A.1 in Appendix A provide a synthetic view of the above results. We summarize them in the following finding:

**Finding 3.** *Within subjects the average treatment effect of inequality on trust is negative in decline ($City_3$), whereas it is not significantly different from zero in the growth environment ($City_1$).*

Table 5 provides evidence of the effect of the shocks to the initial aggregate endowment on senders' average giving rate by testing the difference in the average treatment effects between $City_1$ (growth) and $City_3$ (decline).

Table 5: Treatment effects of growth on trust compared to decline

| Difference in Average Treatment Effects on Giving Rate | Growth *vs* Decline |
|---|---|
| All Sub-groups | $0.150^{***}$<br>(0.005) |
| Sub-group A<br>Poor | $0.122^{*}$<br>(0.084) |
| Sub-group B<br>Middle Class | $0.233^{*}$<br>(0.087) |
| Sub-group C<br>Rich | $0.122^{*}$<br>(0.056) |

NOTE: Mann-Whitney test. Two-tailed p-values are in parentheses.

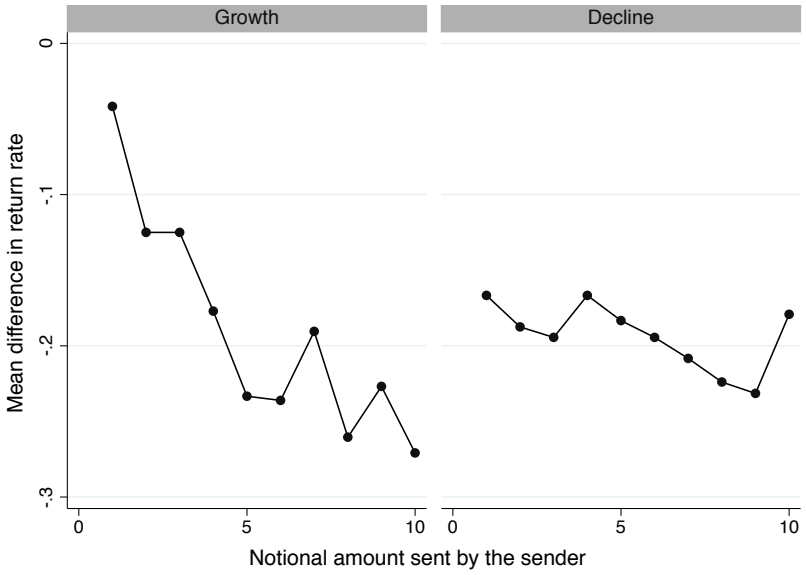
Confronting the results reported in table 4 and 5, we can conclude that economic growth positively affects trust so as to offset the negative effect of inequality. Consistently, endowment decline reinforces the undermining effect of inequality on trust. The same pattern is observed at the sub-group level. These results agree with the evidence of a positive relationship at the individual level between income and trust as measured in the observational studies referred above. We summarize the main finding in table 5 as follows:

**Finding 4.** *Aggregate growth enhances trust by 15% compared to the environment of decline (between subjects).*

## 5.2 Treatment effects of inequality on trustworthiness in the environment of growth *vs* decline

We now turn to the overall effect on trustworthiness of exogenously induced inequality and of shocks to the initial aggregate endowment in $\text{City}_1$ (growth) and $\text{City}_3$ (decline). Figure 3 plots the graphs of the aggregate mean difference in return rate between $\text{City}_1$ (growth), $\text{City}_1$ (decline) and control as a function of the notional transfer from the sender.

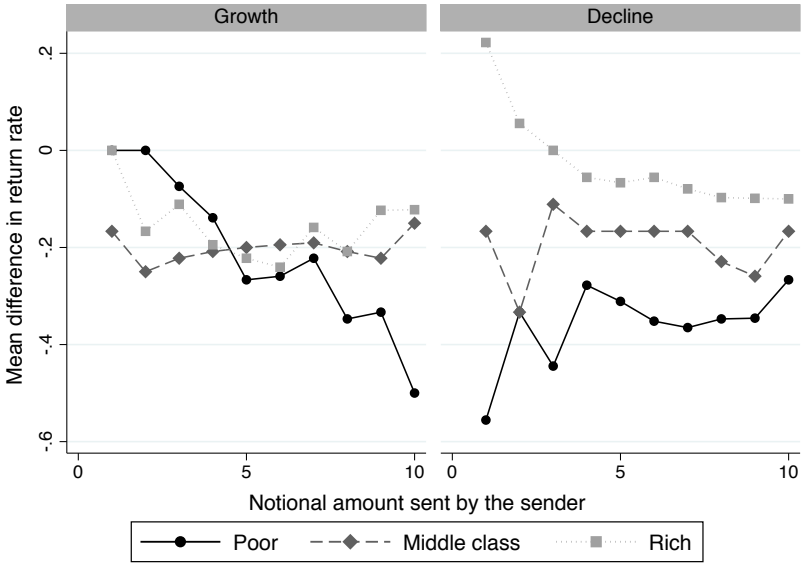
Figure 3: Effect of inequality on receivers' return function in growth and decline




Notice that both functions take negative values, indicating that induced inequality reduce the amount sent back, on average, by receivers. In $City_1$ (growth) (see left panel in Figure 3), the negative slope of the return function shows that, compared to the control, a lower notional amount is sent back by receivers in response to increasing notional levels of money by the senders. In $City_3$ (decline, see right panel in Figure 3) the plotted function is roughly flat, meaning that the decline environment reduces exclusively the average level of transfers from receivers for any notional amount sent by the sender.

To provide a little more detail on these results, figure 4 plots the same functions sorted by sub-groups (poor, middle class and rich) in the growth and decline environments.

Figure 4: Effect of inequality on receivers' return function in growth and decline (by sub-groups).




Given that the plotted functions are almost always negative, figure 4 provides preliminary evidence that induced inequality reduces the average level of return rate from all the sub-groups (poor, middle class and rich).

Figure 4 shows that most of the changes in the slope of the aggregate functions across the two cities are driven by changes in the behaviour of the poor. Specifically, the mean difference in return rate from poor receivers in $City_1$ (growth) is decreasing in the level of the notional transfer from the sender, whereas it is increasing in $City_3$ (decline). Thus, quite surprisingly, the poor are more sensitive to the notional level of transfers from the sender in worse aggregate environments, even though they give less on average than in the growth environment. We acknowledge that results about the sensitiveness of the return rate to the notional amount sent by the senders as reported in Figure 4 are interesting and rather puzzling. To the best of our knowledge we are not aware of theoretical models of trustworthiness where a rationale for such behavioural patterns has been provided.[14]

Overall, this evidence is compatible with the negative average effect of inequality on reciprocity hypothesised by Xiao and Bicchieri (2010). Therefore, we regard the above results as complementing this strand of literature, by showing that this negative effect impinges on the behavioural reactions of the poor and that it is detected in richer aggregate environments (i.e. $City_1$) but not in poorer ones (i.e. $City_3$).

Statistical testing of the above recorded results is provided in table 6, where we report the average treatment effects on receivers' changes in behaviour, sorted by sub-groups and cities.

[14]In looking for an interpretation of this result, consider that poor receivers in a growth environment are more likely to face a richer sender than otherwise (left vs right panel in Figure 4). Presumably, the larger the amount they would receive the richer the sender each poor faces. However, in a declining environment, a larger transfer would also mean a larger sacrifice by the sender that the receiver may be willing to reward. In other words this result suggests that the interaction between inequality aversion and reciprocity may shape quite different behavioural responses due to wealth effects.

Table 6: Treatment effects of inequality on trustworthiness in different growth environments

| Average Treatment Effect on Return Rate | $City_1$ (Growth) | $City_2$ (Steady State) | $City_3$ (Decline) |
|---|---|---|---|
| Effect due to | Inequality + Growth | Inequality | Inequality + Decline |
| All sub-groups | $-0.175^{*}$ (0.055) | $-0.181^{**}$ (0.016) | $0.212^{*}$ (0.057) |
| Sub-group A Poor | −0.155 (0.234) | $-0.358^{**}$ (0.017) | $-0.348^{**}$ (0.032) |
| Sub-group B Middle Class | −0.189 (0.205) | −0.128 (0.388) | −0.234 (0.291) |
| Sub-group C Rich | −0.185 (0.285) | −0.040 (0.661) | −0.060 (0.666) |

NOTE: Wilcoxon signed ranks test. Two-tailed p-values are in parentheses.

Table 6 shows that in $City_2$ and $City_3$ the negative effect of inequality on trustworthiness turns out to be stronger as the receivers' state worsens from rich to poor. However, for all sub-groups of receivers, the negative effect of inequality is not significantly different across the three cities (even though the negative effect of inequality in $City_3$ is approximately 5% stronger compared to $City_1$ and $City_2$).

More specifically, aggregating over all sub-groups, receivers' behavioural reactions to the treatments are not significantly different in the three economic environments. Some behavioural heterogeneity is recorded at the sub-group level. Poor receivers in $City_1$ (growth) reduce their average return rate less than they do in $City_3$ (decline), even though these changes in behaviour across cities are not statistically significant. Conversely, the exogenous change in the aggregate initial endowment across cities does not affect the pattern of transfers from middle class receivers, who reduce – albeit not statistically significantly – their return rate by approximately the same amount in all the environments. Finally, rich receivers do not exhibit significant changes in behaviour in $City_3$, while they reduce – though not statistically significantly – their average return rate in the growth environment ($City_1$). A synthetic view of the results above is reported in the OLS regressions in table A.2 in Appendix A. They can be summarized as follows:

**Finding 5.** *Within subjects the average treatment effect of inequality on trustworthiness is recorded to be −19% across all cities.*

Table 7 provides a measure of the effect of the exogenous shock to the aggregate initial endowment on receivers' average return rate by testing the difference in the average treatment effects between $City_1$ (growth) and $City_3$ (decline).

Table 7: Treatment effects of growth on trustworthiness compared to decline

| Difference in Average Treatment Effects on Return Rate | Growth *vs* Decline |
|---|---|
| All sub-groups | 0.037<br>(0.867) |
| Sub-group A<br>Poor | 0.193<br>(0.228) |
| Sub-group B<br>Middle Class | 0.045<br>(0.936) |
| Sub-group C<br>Rich | −0.124<br>(0.158) |

NOTE: Mann-Whitney test. Two-tailed p-values are in parentheses.

Overall, trustworthiness reacts only to exogenously induced inequality and not to shocks to aggregate initial endowments. We summarize the results from table 7 as follows:

**Finding 6.** *Aggregate growth does not affect trustworthiness compared the environment of decline (between subjects).*

Hence, we record a difference in the behavioural patterns in that trust reacts to the change in the aggregate economic conditions, while trustworthiness does not. Notice that, such non-responsiveness of trustworthiness to changes in aggregate endowment found in our data is consistent with results reported in other experiments (e.g. Fehr et al. 2003; Bellemare and Kröger 2007; Bigoni et al. 2016).[15]

# 6 Conclusions

The effects of shocks to endowments on trust were analysed in a lab experiment undertaken using a sample of University students in Southern Italy. Within the framework of a trust game (Berg et al. 1995) we addressed two questions concerning the relationship between inequality, growth and trust. Specifically, what is the impact of induced endowment inequality on trust and trustworthiness? Is this impact different if inequality is brought about by growth or decline of aggregate endowment?

In response to these questions we find that a standard measure of general trust decreases with an increase in inequality (within-subject analysis), whereas it increases in response to an increase in the aggregate level of the endowment (between-subject analysis). In particular, we find that exogenously induced endowment inequality reduces the average level of trust by 11% and trustworthiness by 18%. Both the average behavioural response and the group-specific reactions significantly change depending on the aggregate level of endowment. A

[15]Specifically, Fehr et al. (2002) and Bellemare and Kröger (2007), find no significant effect of individual income on trustworthiness in regressions where income is used as a control. Bigoni et al. (2016) also find that, differently from trust, trustworthiness does not differ significantly across geographical areas in Italy, characterized by different income levels.

significant reduction in trust of 15% was found where the average endowment has been reduced compared to the case where the average endowment has been increased. Thus, in the latter case, the negative effect of inequality on trust is completely offset by the growth effect.

A remarkable feature of these aggregate average effects is that they arise from the different behavioural responses of different income groups, in particular, as a consequence of quite sensitive behavioural responses by those who end up at the bottom of the endowment distribution after treatment.

In comparison to other analogous experimental studies (Anderson et al. 2006; Hargreaves Heap et al. 2013), we find rather clear treatment effects of inequality on trust. These results are qualitatively consistent with empirical evidence provided in several attitudinal studies (e.g., Alesina and La Ferrara 2002 on inequality and trust, and Ananyev and Guriev 2018 on growth and trust) lending support to the external validity of our experiment.

Of specific interest in our analysis is the documented role of the behavioural response of groups of subjects at the bottom of the endowment distribution and how this response is particularly significant in an environment with lower aggregate wealth. These results provide empirical evidence motivating research on how economic crisis in a democracy may alter political equilibria by creating favorable conditions for an increase in the demand and supply of populist policies as recently studied in Guiso et al. (2017).

More generally, once we posit that trust is an important sociological element for the explanation of long-run development, the results from our experiment contribute to motivating explicit theoretical work on the economic determinants of trust.

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# Appendix A. Regression analysis

### Senders

Table A.1 reports the results of a diff-in-diff econometric model, which allows for a parametric testing of the statistical significance of differences in senders' behavioural responses to the three economic environments according to the position held by subjects in the initial distribution of endowments. The first column reports the results of estimating the model with a full set of nine fixed interaction effects and the reported coefficients measure the response of subjects compared to the null of no response; consequently, the coefficients are identical to (and the statistical tests of significance are the parametric equivalent of) the results reported in the last three lines of table 4. Perhaps more interestingly, the second column reports the results of estimating the same equation with the 'rich' interaction dummies omitted, but with overall fixed effects for the state of the economy included. Hence, in this case, the reported coefficients measure the difference-in-difference in the behavioural responses of the poor and the middle class directly compared to the rich.

Table A.1: Regression analysis on senders' behaviour

| Difference-in-difference Giving Rate | Within Subjects | Between Subjects |
|---|---|---|
| Poor Growth | −0.077* | −0.188** |
| | (0.043) | (0.071) |
| Poor Steady State | −0.155*** | −0.111 |
| | (0.053) | (0.120) |
| Poor Decline | −0.200*** | −0.188*** |
| | (0.055) | (0.066) |
| Middle Class Growth | 0.100 | −0.011 |
| | (0.079) | (0.097) |
| Middle Class Steady State | −0.133 | −0.088 |
| | (0.146) | (0.181) |
| Middle Class Decline | −0.133* | −0.122 |
| | (0.065) | (0.074) |
| Rich Growth | 0.111* | - |
| | (0.056) | |
| Rich Steady State | −0.044 | - |
| | (0.107) | |
| Rich Decline | −0.011 | - |
| | (0.035) | |
| N | 72 | |
| R-squared | 0.277 | |

NOTE: Robust standard errors in parentheses.

As noted previously, for all the sub-groups of senders, the effect of inequality on the average level of giving rate is stronger in the steady state and decline compared to the growth environment. The results in the second column confirm the strength of the differences in the

behavioural response to the treatment arising from the position in the distribution of initial endowments. In particular, the reported results confirm that the poor exhibit the strongest negative response – in terms of reduced trust - to the treatment. Indeed, we observe that the poor give systematically less than the rich. In contrast, no statistically significant difference in the average level of giving rate between the middle class and the rich is found.

**Receivers**

Table A.2 reports analogous results for receivers. The dependent variable is the difference in return rate by receivers between treatment and control. As a further control, we add the notional amount sent by the sender. Standard errors are clustered at the subject level to account for the non-independence of the 10 observations for each receiver due to the strategy method.

Table A.2: Regression analysis on receivers' behaviour

| Difference-in-difference Return Rate | Within Subjects | Between Subjects |
|---|---|---|
| Notional amount sent by the sender | 0.014* (0.007) | |
| Poor Growth | −0.134 (0.217) | −0.059 (0.320) |
| Poor Steady State | −0.298** (0.132) | −0.370** (0.157) |
| Poor Decline | −0.280** (0.131) | −0.332* (0.180) |
| Middle Class Growth | 0.121 (0.167) | −0.046 (0.291) |
| Middle Class Steady State | −0.032 (0.121) | −0.103 (0.160) |
| Middle Class Decline | −0.113 (0.159) | −0.165 (0.202) |
| Rich Growth | −0.075 (0.236) | - |
| Rich Steady State | −0.071 (0.117) | - |
| Rich Decline | −0.051 (0.145) | - |
| N | 720 | |
| R-squared | 0.159 | |

NOTE: Clustered standard errors in parentheses.

The first line of the first column shows that the higher is the level of notional transfer from the sender, the lower is the average level of return rate. Again, the results are similar to those reported above in table 6.[16] The coefficient estimates reported in column two emphasise the

[16]In this case, however, the reported results are not identical to those of the non-parametric tests showed in table 6 because of the additional control of the notional amount sent by senders.

difference in the behavioural responses to the changes in the aggregate economic environment between rich and poor. Indeed, the poor offer a systematically lower rate of return than the rich do. Conversely, the middle class does not exhibit significant behavioural differences compared to the rich.

# Appendix B. Analysis of ex-post inequality

The logic of the trust game is such that trust and trustworthiness affect the distribution of the final outcomes and hence ex-post inequality. Clearly, starting from conditions of uniform endowments, ex-post inequality is necessarily (weakly) larger than ex-ante inequality (equal to zero). In general, starting from heterogeneous endowments, the outcome of the trust game almost always will either (weakly) increase or decrease the level of ex-post inequality, according to senders' and receivers' behaviour.

Hence, one interesting question we can ask is the following: is ex-post inequality larger or lower in the treatment compared to the ex-post inequality in the control? To answer this question we compute a simple F-test on the difference among Gini coefficients of the ex-post distributions in the treatments *vis à vis* the ex-post inequality in the control. This is reported in Table B.1 for the average treatment effect and across different growth environments.[17]

Table B.1: Treatment effects on ex-post inequality (by cities)

| Treatment Effects on Ex-post Inequality | |
|---|---|
| Average all Cities | 0.059*** (0.000) |
| $City_1$ (Growth) | −0.006 (0.668) |
| $City_2$ (Steady State) | 0.054*** (0.000) |
| $City_3$ (Decline) | 0.058*** (0.000) |

Note: F-test. Two-tailed p-values are in parentheses.

Overall, table B.1 documents that the level of ex-post inequality in the treatments increases, on average, compared to the ex-post inequality in the control (see the first line of table B.1). Interesting additional information can be obtained by pairwise comparisons between treatments and control (lines two to four): the Gini coefficient of the distribution of final endowments significantly increases on average compared to the control in $City_2$ (steady state) and $City_3$ (decline) but not in $City_1$ (growth). Once again economic growth acts as a check on inequality, so we conclude that, in our sample,

**Finding 7.** *Except than in the case of growth, ex-ante inequality breeds further ex-post inequality.*

[17]Results are not qualitatively different when different inequality indexes, like the coefficient of variation or the Atkinson's index, are used.

# Appendix C. Description of the experimental instructions

In this appendix we report the instructions provided to subjects for the playing of the trust game described in the text. Notice, for the sake of completeness, that the actual experiment included additional features besides the two trust games whose analysis has been provided in this paper. In particular, the experiment also included a dictator game, a further trust game, a series of lottery choice problems and a questionnaire where information on various personal characteristics and attitudes were collected. These were not relevant here, given the difference-in-difference nature of the analysis implying that fixed individual characteristics, such as preferences, play no role in determining the reported results. Thus, in what follows only the English translation of the instructions (originally provided in Italian) for the two trust games analysed in the main text are reported.

## Instructions provided to subjects

In this experiment you will earn some tokens with a value of 0.30 euros each. As a show-up fee you will earn 5 tokens (1.50). How can you earn additional tokens? The experiment consists of two phases with one game for each phase. In each game you will interact with another participant who will be randomly and anonymously matched to you. Your earnings will be the result of the choices from both of you. At the end of the session, one of the games will be selected as payoff relevant. Then, the tokens you earned in the experiment will be converted in euros and given to you in cash.

At the very beginning of the session, the software will randomly divide the sample of the participants in two categories of players: A and B. Throughout the experiment, you will keep the category to which you have been randomly assigned.

### Phase 1

In this phase, 20 tokens (6 euros) will be assigned to each participant in addition to the show-up fee of 5 tokens (1.50 euros). Hence, each participant gets an *initial endowment* of 25 tokens (7.50 euros).

You are going to play a two-person game. If you are a player of the category A (B), you will be randomly and anonymously matched to another player of the category B (A).

Player A has to choose whether she wants to send to player B any discrete amount in between 0 and 10 tokens.

Player B gets three times the amount sent by A. Then, player B has to decide whether to give back to A any integer fraction of the received amount. More precisely, B declares the fraction of the received amount she wants to give back for *any* positive amount (from 1 to 10 tokens) player A may decide to send to him/her.

We now illustrate in more detail how you can take your decision depending on the category (A or B) to which you have been randomly assigned.

**Players A**

You have been randomly assigned to the players of the category A. You can send any discrete amount in between 0 and 10 tokens to the player of the category B randomly and anonymously matched to you. Please, remember that player B will receive a tripled amount of the sum that you originally sent. Moreover, player B can choose to give back to you any integer fraction of the amount received.

**Players B**

You have been randomly assigned to the players of the category B. You have to choose to give back any integer fraction (zero included) of the received amount for any of the possible decisions from A (from 1 to 10 tokens). Remember that A sent 1/3 of the amount that you receive.

For example, the software will ask you 10 questions like: "How many tokens would you give back to A if you received 3 tokens? A sent to you 1 token." To each of these questions, you can choose to give back any integer fraction (zero included) of the received amount. The outcome of the game will be the answer to the question that matches the actual transfer from player A.

**Phase 2**

This phase consists of a game that is identical to the game that you played in phase 1. Therefore, players A and B make their choices in the way described above. You will be randomly and anonymously matched to a player of the category A or B, who is different from the one to whom you have been randomly matched in phase 1.

**Treatment 1**

In this phase, the software will randomly divide the sample of A and B players in three subgroups. To 1/3 of the A and B players the software will add 10 tokens to their endowment of 25 tokens; therefore they will have an endowment of 35 tokens. To 1/3 of the A and B players the software will add 5 tokens to their endowment of 25 tokens; therefore they will have an endowment of 30 tokens. Finally, the endowment of 1/3 of the A and B players will be held fixed to 25 tokens.

Before you take your decision, you will be informed if your endowment has been increased (of 10 or 5 tokens) or held fixed with respect to phase 1. However, you will not be informed on the endowment of the A or B player randomly and anonymously matched to you.

For example, the software will inform you that, as a result of the random draw, your endowment has been increased of 10 (5) tokens. Therefore, you have an *endowment* of 35 (30) tokens.

**Treatment 2**

In this phase, the software will randomly divide the sample of A and B players in three subgroups. To 1/3 of the A and B players the software will add 5 tokens to their endowment of

25 tokens; therefore, they will have an endowment of 30 tokens. The endowment of 1/3 of the A and B players will be held fixed to 25 tokens. Finally, to 1/3 of the A and B players the software will subtract 5 tokens to their endowment of 25 tokens; therefore, they will have an endowment of 20 tokens.

Before you take your decision, you will be informed if your endowment has been increased, held fixed or decreased with respect to phase 1. However, you will not be informed on the endowment of the A or B player randomly and anonymously matched to you.

For example, the software will inform you that, as a result of the random draw, your endowment has been decreased (increased) of 5 tokens. Therefore, you have an *endowment* of 20 (30) tokens.

**Treatment 3**

In this phase, the software will randomly divide the sample of A and B players in three subgroups. The endowment of 1/3 of the A and B players will be held fixed to 25 tokens. To 1/3 of the A and B players the software will subtract 5 tokens from their endowment of 25 tokens; therefore, they will have an endowment of 20 tokens. Finally, to 1/3 of the A and B players the software will subtract 10 tokens from their original endowment of 25 tokens; therefore, they will have an endowment of 15 tokens.

Before you take your decision, you will be informed if your endowment has been reduced (of 10 or 5 tokens) or if it has been held constant with respect to phase 1. However, you will not be informed on the endowment of the A or B player randomly and anonymously matched to you.

For example, the software will inform you that, as a result of the random draw, your endowment has been decreased of 10 (5) tokens. Therefore, you have an *endowment* of 15 (20) tokens.