Red Nacional de Investigadores en Economía

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DOCUMENTO DE TRABAJO N° 96

Diciembre de 2021

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Citar como:
Bejarano, Hernán, Joris Gillet e Ismael Rodriguez-Lara (2021). When the Rich Do (Not) Trust the (Newly) Rich: Experimental Evidence on the Effects of Positive Random Shocks in the Trust Game. *Documento de trabajo RedNIE N°96.*

When the rich do (not) trust the (newly) rich: Experimental evidence on the effects of positive random shocks in the trust game

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June 16, 2020

Abstract

We study behavior in a trust game where first-movers initially have a higher endowment than second-movers but the occurrence of a positive random shock can eliminate this inequality by increasing the endowment of the second-mover before the decision of the first-mover. We find that second-movers return less (i.e., they are less trustworthy) when they have a lower endowment than first-movers, compared with the case in which first and second-movers have the same endowment. Second-movers who have experienced the positive shock return more than those who did not; in fact, second-movers who have experienced the positive shock return more than second-movers who had the same endowment as the first-mover from the outset. First-movers do not seem to anticipate this behavior from second-movers. They send less to second-movers who benefited from a shock. These findings suggest that in addition to the distribution of the endowments the *source* of this distribution plays an important role in determining the levels of trust and trustworthiness. This, in turn, implies that current models of inequality aversion should be extended to accommodate for reference points if random positive shocks are possible in the trust game.

Keywords: Trust game, endowment heterogeneity, random shocks, luck, inequality aversion, reference-dependent utility, reference points.

JEL Codes: C91, D02, D03, D69.

1. Introduction

Incomplete contracts are ubiquitous in economic interactions (Hackett 1993, Chen 2000, Anderhub et al. 2002). Because it is not always possible to specify contingent responses to unforeseen circumstances, trading relations are often characterized by informal agreements. As a result, trust and trustworthiness are key in promoting cooperation and exchange (Smith 1776, Arrow 1974, Guiso et al. 2004). Trust and trustworthiness are also essential factors at the macroeconomic level helping with the development of a society (Knack and Keefer 1997, Zak and Knack 2001, Algan & Cahuc 2010, Bjørnskov 2012, Algan et al. 2016, Batrancea et al. 2019). As such, understanding the factors that can affect the levels of trust and trustworthiness is of first-order importance.

One element that is likely to affect the levels of trust and trustworthiness is the degree of heterogeneity between group members (Alesina & La Ferrara 2000, 2002); in particular, whether or not people differ in their wealth.[1] One feature that we believe to be particularly important in this context concerns how the wealth of individuals is established. Milanovic (2015) and Frank (2016) conclude that (good) luck plays an essential role in determining economic success and income. Theories of affect further suggest that changes in wealth that result from positive random shocks (e.g., winning the lottery, experiencing extraordinarily good weather conditions for the crops you are growing, finding an oil well on your property) can put people in a good mood and this can influence their decision-making (Loewenstein 2000, Lerner et al. 2015, George and Dane 2016). When positive random shocks occur in strategic settings, they are likely to shape the behavior of both those affected by the positive random shock (i.e., the lucky ones) as well as those interacting with them; e.g. by affecting attitudes and beliefs regarding reciprocity and prosocial behavior. This paper uses a laboratory experiment to study the levels of trust and trustworthiness when people differ in their wealth but the occurrence of a positive random shock can eliminate the existing inequality. Are relatively richer people more or less likely to trust other rich people than people with a smaller endowment? But also, what if a relatively poor person is lucky and experiences a random positive shock that increases her wealth? Will this change the level of trust exhibited by the rich people towards them, compared with their behavior in situations where the others have the same wealth from the outset? These are the questions we seek to answer in the current paper.

1 There is evidence that wealth inequalities have noteworthy consequences in a variety of settings, including antisocial behavior (Fehr 2018, Gangadharan et al. 2019), happiness (Alesina et al. 2004, Oishi et al. 2011), and cooperation (Zelmer 2003, Tavoni et al. 2011, Hargreaves-Heap et al. 2016, Camera et al. 2020).

By looking at the effect of random positive shocks on the levels of trust and trustworthiness our research can shed light on events that occur in real life. In the context of incomplete labor contracts, there exists evidence that wages and effort react to the occurrence of productivity shocks (Jayachandran 2006, Eliaz & Spiegler 2014). The rationale is that changes in wages that occur during economic recessions or expansions can trigger negative or positive reciprocity responses from workers, depending on the wage that they use as a reference point (Gerhards and Heinz 2017, Buchanan and Houser 2020, Bejarano et al. 2021). The current paper is an attempt to examine how the occurrence of a positive random shock that can affect the wealth of individuals can influence the levels of trust and trustworthiness, which are key in promoting exchange in the context of incomplete contracts. This question is also important from a macroeconomic perspective. Consider two companies that operate in different countries or markets (one rich and one poor). Before any exchange takes place, there is a positive random shock that affects the poor company because there is a technological shock in its market, an increase in the demand or a new discovery; e.g., you may think of a company that has benefitted from the current COVID19 pandemic. This shock is such that the poor company becomes rich. If companies interact in a context of incomplete contracts, how would this random event affect the strategic interaction?

We follow the procedures in Bejarano et al. (2018, 2020) by using a variation of the trust game in Berg et al. (1995) and consider the possibility that relatively richer first-movers – who start out with a higher endowment than the second-movers – behave differently depending on the level or the source of the inequality.[2] In our setting, the occurrence of a positive random shock depends on the outcome of a die roll that can eliminate the wealth inequality for specific pairs of first- and second-movers by increasing the endowment of the second-mover before the decision of the first-mover. Our experimental design incorporates two additional treatments – one where first-movers have a higher endowment than the second-movers, the other where first- and second-movers have the same endowment – but where these distributions exist from the outset and positive random shocks are not possible. This allows us to decouple the effect of the distribution of wealth and the source of the distribution on the levels of trust and trustworthiness.

[2] In the trust game, first-movers decide the amount they want to send (if any) to second-movers. Any amount sent is multiplied by the experimenter by a given factor before the second-mover decides the amount to return (if any). Under the assumption of selfish preferences, the sub-game perfect equilibrium is that second-movers will return nothing to the first-movers, and consequently first-movers will not send any positive amount to second-movers. The behavior of first-mover has been usually identified in the literature as the level of trust, whereas how much the second mover returns is usually interpreted as the level of trustworthiness.

We use our experimental data to test a number of different behavioral predictions we posit using outcome-based models.[3] Models of inequality aversion, for instance, predict that second-movers will return less when they are relatively poorer than first-movers but traditional theory (Fehr & Schmidt 1999, Bolton & Ockenfels 2000) remains silent on the potential influence of the source of the inequality. We show that extending the model to include reference-dependent utility (Tversky & Kahneman 1991, 1992; Kőszegi & Rabin 2006, 2007, 2009, Masatlioglu & Ok 2005, Masatlioglu & Uler, 2013, Masatlioglu & Raymond, 2016, Dato et al. 2017) predicts that second-movers will return more when they experience a positive random shock, compared with a setting in which second-movers start out with the same endowment as first-movers. This prediction is further supported by theories of affect suggesting that psychological factors and emotions can influence decision making (Loewenstein 2005, Lerner et al. 2015, George & Dane 2016). In this line of research, there is evidence that (induced) emotions can influence pro-social behavior. Capra (2004) find that people are more generous in a dictator game when they have been put into a good mood.[4] In Matarazzo et al. (2020) participants play a "luck card game" in which they can earn or loss money depending on draws from a deck of cards. The draws are manipulated in such a way that all participants end up receiving the same final endowment but some of them do it after being lucky in the card game (i.e., they add money to their (low) initial endowment), while others are unlucky in the card game (i.e., they lose money compared with their (high) initial endowment). Matarazzo et al. (2020) find that lucky participants are more generous than unlucky participants in a subsequent dictator game. Relatedly, Kidd et al. (2013) find that winners of a tournament donate more in a dictator game, especially when their realized ranking in the tournament is above the one they expected. In the light of these results, we expect more reciprocity in the trust game from "newly rich" second-movers who experience a positive random shock, compared with "originally rich" second-movers who do not experience any positive random shock.

As for the level of trust, an altruistic first-mover who wants to reduce the inequality is expected send more to a relatively poorer second-mover than to a richer second-mover. However, models of inequality aversion do not predict any difference in the behavior of first-movers towards "originally rich" second-movers (who were given the same endowment as the first-mover from the outset) and "newly rich" second-movers (who started out poor but experienced a positive random shock). Assuming that first-movers can anticipate that the occurrence of the positive random shock will lead to an increase in the utility of second-movers and that this affects their

[3] Expectations about others' behavior and intentions are also important to determine behavior (McCabe et al. 2003, Chaudhuri & Gangadharan 2007, Falk et al. 2008, Houser et al. 2008, Johansson-Stenman et al. 2013, Cox et al. 2016). For theoretical models that incorporate the role of beliefs and intentions see, among others, Rabin (1993), Dufwenberg & Kirchsteiger (2004) and Cox et al. (2007).

[4] See Kirchsteiger et al. (2006) for related evidence in the gift-exchange game and Drouvelis & Grosskopf (2016) for the effect of induced emotions in the public good game.

expectations of the level of trustworthiness we show that first-movers may behave differently in these two settings if we incorporate the idea of reference points and reference-dependent utility into the model. [5]

Our results provide evidence that people care about the *source* of inequality in the trust game, suggesting that reference-dependent preferences and theories of affect can help explain the behavior of first and second-movers. We find that second-movers who experience a positive shock that increases their endowment return a higher share of the surplus that is generated by the action of the first-mover than second-movers that were initially given the same endowment as first-movers. Newly rich or lucky second-movers are therefore more trustworthy than those second-movers who are originally rich. First-movers do not seem to anticipate this behavior from second-movers; in fact, we find that first-movers send less to second-movers who experience a positive random shock, compared to what they send to second-movers that have the same endowment as them from the outset. This provides evidence that rich first-movers trust "newly" rich second-movers less than they do those that are "originally" rich.

To our knowledge, our experiment is the first one that examines how the occurrence of positive random shocks can influence behavior in the trust game. The determinants of trust and trustworthiness have been extensively studied in laboratory experiments (Chaudhuri & Gangadharan 2007, Eckel & Wilson 2011, Johnson & Mislin 2011, Cooper & Kagel 2013, Alos-Ferrer & Farolfi 2019). Most of the studies that examine how wealth inequalities influence trust and trustworthiness tend to vary the initial endowments of the first and/or the second-movers to examine how the behavior of people respond to differences in wealth (Anderson et al. 2006, Ciriolo 2007, Lei & Vesely 2010, Xiao & Bicchieri 2010, Smith 2011, Brülhart & Usunier 2012, Hargreaves-Heap et al. 2013, Calabuig et al. 2016, Rodriguez-Lara 2018). Our findings align with this literature in that we show that inequality is important in explaining the behavior in the trust game. However, we advance our understanding on the factors that influence trust and trustworthiness by showing that it is also important to account for the *source* of inequality; i.e., the way in which the distribution of wealth is determined.

The most closely related papers to ours are Bejarano et al. (2018, 2020), who study how *negative* random shocks can influence the level of trust and trustworthiness. In both papers, the first- and the second-mover start out with the same endowment, but the occurrence of negative random shock can decrease the endowment of one of the players. Bejarano et al. (2018) argue (and find support for the hypothesis) that random negative shocks that affect the endowment of second-

5 In fact, first-movers can send more or less to (lucky) second-movers, depending on their beliefs regarding the reciprocal behavior of second-movers. We discuss in detail our theoretical predictions in Section 2.

movers can lead to differences in the behavior of first-movers by making the inequality more salient; i.e., their data suggest that richer first-movers send less to relatively poor second-movers when their wealth level is the result of a negative random shock, compared with the case in which second-movers are relatively poor from the outset. Bejarano et al. (2020) focuses on the behavior of first-movers when a negative random shock can occur to them. They find that the *possibility* of the shock is also important to explain the behavior of first-movers, but the *occurrence* of the shock is not. In both papers, relatively poor second-movers behave in the same manner towards relatively rich second-movers no matter whether or not the inequality was generated by a negative random shock. [6] The current paper departs from these studies in that we consider a setting in which people already differ in their wealth, but the inequality can be eliminated if second-movers are lucky. In this way, we extend the findings of Bejarano et al. (2018, 2020) to examine how trust and trustworthiness respond to the occurrence of *positive* random shocks that eliminate wealth inequalities. The fact that positive random shocks influence the behavior of second-movers in our trust game relate our paper to theories of affect that predict a positive response from those who experience these shocks (Matarazzo et al., 2020) as well as to a strand of the literature that investigates how changes in economic conditions (e.g., economic expansions) can influence the behavior of people in the labor setting (Bejarano et al., 2021)

The remainder of the paper is organized as follows. We present our experimental design and derive our main hypotheses in Section 2. The results are presented in Section 3. Section 4 concludes. We relegate to the Appendix the original instructions of the experiment and additional data analyses. This includes a comparison with the results in Bejarano et al. (2018) where second-movers also suffer a change in their endowment but this is a consequence of a negative random shock.

[6] Bejarano et al. (2020) relate their findings to the occurrence of negative random shocks (e.g., natural disasters) in the field. Their contribution is to show that these shocks may not have a different effect on trust and trustworthiness than the inequality they generate. For studies that use field experiments to investigate how trust and trustworthiness respond to natural disasters see, among others, Cassar et al. (2007), Kanagaretnam et al. (2009), Fleming et al. (2014) or Calo-Blanco et al. (2017).

2. Experimental design and hypotheses

2.1. Experimental Design and procedures

A total of 408 students with no previous experience in similar experiments were recruited to participate in 18 experimental sessions conducted at the ESI Chapman University between May 2014 and May 2018.[7]

At the beginning of each session, participants were welcomed and located in two different rooms (A and B). Once all of the students were seated, they were asked to read the instructions at their own pace (see Appendix A for the original instructions). The experimental material on the table of each participant contained an envelope with their initial endowment. Using the usual procedures for non-computerized trust game experiments, first-movers (in-room A) were asked to decide the amount of money they wanted to send (if anything) to their matched second-mover (in room B). The amount sent by each first-mover was placed in the envelope with the ID of their matched second-mover, and then tripled by the instructor in a separate room before being given to second-movers. Upon receiving these envelopes, second-movers were asked to decide the amount of money they wanted to return (if anything) to their matched first-mover.

The initial endowment of first-movers in all treatments was 21 E$.[8] Second-movers also received an initial endowment of 21 E$ in our *Baseline-Equal* treatment. In *Baseline-Unequal*, second-movers received 7 E$. In the *Bonus* treatments, all second-movers started with an endowment of 7 E$, but we rolled a die in front of the individual first-mover they were paired with before they made their decision. If the outcome of the die was odd the second-mover's endowment was increased to 21 E$ (*Bonus-Equal*). Otherwise, second-movers kept their initial endowment of 7 E$ (*Bonus-Unequal*). To inform second-movers on the outcome of the die, we asked first movers to record this in an "Outcome card" that second-movers received from first-movers. When we distributed the envelopes to second-movers we asked them to show the outcome card to the instructor. We increased the initial endowment of the second-mover if the outcome of the die was odd before making any decision about the amount to return. Table 1 summarizes our treatments. This includes information on the number of pairs in each treatment.

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[7] We wanted to have unexperienced subjects, what delayed the data collection.

[8] We use experimental Dollars (E$) in our experiment. These were converted to actual dollars at the end of each session (1 E$ = $0.50).

Table 1. Summary of treatment conditions

		Initial endowments		
Treatment	**N**	**First-mover**	**Second-mover**	
Baseline-Equal	53	21 E$	21 E$	
Baseline-Unequal	52	21 E$	7 E$	
Bonus-Equal (Bonus)	45	21 E$	7 E$ ➔ 21 E$	The outcome of the die was odd, and 14 E$ were increased from the initial endowment of the second-mover.
Bonus-Unequal (No bonus)	54	21 E$	7 E$ ➔ 7 E$	The outcome of the die was even and the second-mover kept her initial endowment.

Note. N refers to the number of pairs in each treatment.

Baseline sessions lasted about 45 minutes, while bonus sessions lasted about an hour. The average earnings across all sessions were $20.80, including a $7 show-up fee.

2.2. Power analysis

We use G*Power 3 (Faul et al., 2007) to determine the sample size. Our primary interest is to test how rich first-movers behave towards equally rich second-movers, depending on whether or not a positive random shock has increased the endowment of second-movers. Our null hypothesis is, therefore, that there is no difference in the behavior of first-movers in the Baseline-Equal and the Bonus-Equal treatments. To obtain power of 0.80 with $\alpha = 0.05$ to detect a medium effect of $d = 0.5$, the projected sample size assuming a Laplace distribution is at least 86 pairs (i.e., 43 pairs in each treatment). As can be seen in Table 1, our study was carried out on 98 pairs for these treatments.

2.3. Hypotheses

We rely on outcome-based models to derive predictions regarding the behavior of the first and the second-movers. As we shall see, models of inequality aversion predict that first and second-movers will behave differently depending on whether they have the same endowments (equal treatments) or fist-movers have a higher endowment than second-movers (unequal treatments). However, these models predict no difference in the behavior of first- and second-movers depending on how the distribution of endowments is determined. Subsequently, we augment the models of inequality-aversion to allow for the *source* of the distribution to play a role in the levels of trust and trustworthiness by incorporating the idea of reference-dependent utility and theories of affect.

Ley e_i denote the level of endowment of player $i \in \{1, 2\}$, where $i = 1$ ($i = 2$) stands for the first-mover (second-mover) and $e_1 \geq e_2 > 0$. The first-mover decides the amount $X \in [0, e_1]$ to send to the second-mover, who has to choose the amount Y to return. We define the return rate $y \in [0, 1]$ as the share of the available funds that second-movers return to first-movers; i.e., $y = Y/3X$. We denote π_i the final payoffs of each of player $i \in \{1, 2\}$, which is determined as follows:

(1) $\pi_1 = e_1 - X + Y = e_1 + X(3y - 1)$

(2) $\pi_2 = e_2 + 3X - Y = e_2 + 3X(1 - y)$

Using backward induction, it is straightforward to show that the Nash equilibrium, if participants only cared about their own payoffs, is that first-movers will send nothing to second-movers. This is because second-movers have no incentive to return any positive amount. The fact that we do observe trust and trustworthiness highlights the role of pro-social behavior or other-regarding preferences in trust game experiments (Chaudhuri & Gangadharan 2007, Eckel & Wilson 2011, Johnson & Mislin 2011, Cooper & Kagel 2013, Alos-Ferrer & Farolfi 2019).

One central idea in the literature of pro-social behavior concerns the possibility that subjects are inequality-averse and dislike payoff differences (Fehr & Schmidt 1999, Bolton & Ockenfels 2000). To allow for this possibility, we consider that players have the following utility function:

(3) $u_i = \pi_i - \alpha_i (\pi_i - \pi_j)^2$

where π_i and π_j are given by equations (1) and (2) and $\alpha_i \geq 0$ measures the extent to which player i is concerned about the inequality, where $i, j \in \{1,2\}$ and $i \neq j$. If we solve for the optimal behavior of second-movers who are inequality-averse, we find that their optimal return rate will be given by:

(4) $y^* = \frac{2}{3} - \frac{1}{24\,X\,\alpha_2} + \frac{e_2 - e_1}{6X}$

This equation shows that optimal return depends on the difference between $e_2 - e_1$, thus second-movers will return less when there is an inequality in favor of the first-mover (Xiao & Bicchieri 2010, Hargreaves-Heap et al. 2013).

Prediction 1a. *If second-movers are inequality averse, they will return less in the Baseline-Unequal than in the Baseline-Equal treatment. Additionally, second-movers will return less in the Bonus-Unequal than in the Bonus-Equal treatment.*

An obvious shortcoming of the previous model is that it assumes that what players care about is just the distribution of the endowments, not the way this distribution is generated. As a result, a simple model of inequality aversion would predict no differences in the behavior of second-movers in the Bonus-Equal and the Baseline-Unequal treatments. We hypothesize that not only the distribution of endowments is important in determining the level of trust and trustworthiness, but that reference points will also shape behavior; e.g., when a positive random shock is realized second-movers will feel more likely to reciprocate. This prediction is in line with experimental evidence suggesting that positive random shocks that affect the wealth of individuals (Matarazzo et al. 2020) or positive surprises from winning (Kidd et al. 2013) influence generosity. We build on the idea of reference-dependent utility and theories of affect to account for this possibility. In particular, we assume that second-movers evaluate any "gain-loss" utility from their initial endowment using a reference point (r). To do this, second-movers use the function $f(e_2 | r) = e_2 + f(e_2, r)$ where the value of $f(e_2, r)$ depends on whether their final endowment is above or below their reference point (r) as follows:

$$(5)\ f(e_2, r) = \begin{cases} \eta\ (e_2 - r) & \text{if } e_2 \geq r \\ \eta\ \lambda\ (e_2 - r) & \text{if } e_2 < r \end{cases}$$

where $\eta \geq 0$ and that $\lambda > 1$ to account for the fact that losses loom larger than equal-sized gains. In this model, there is a gain in utility $f(e_2, r) = \eta\ (e_2 - r) \geq 0$ when second-movers receive a *bonus*; i.e., when their new endowment is above their reference point $e_2 \geq r$. When the endowment of the second-movers falls below a reference point $e_2 < r$ then there is a loss in utility $f(e_2, r) = \eta\ \lambda\ (e_2 - r) < 0$. If we allow for reference-dependent utility, we find that the optimal return of second-movers who are inequality-averse and have reference-dependent utility will be the following:

$$(6)\ y^* = \frac{2}{3} - \frac{1}{24\ X\ \alpha_2} + \frac{e_2 - e_1}{6X} + \frac{f(e_2, r)}{6X}$$

This equation, in turn, implies that second-movers will be more (less) reciprocal if their endowment is above (below) their reference point; i.e., the value of $f(e_2, r)$ determines their level of trustworthiness. One relevant issue to be addressed is the reference point of second-movers. We hereafter assume that second-movers use the "status-quo" or their initial endowment as reference point (Masatlioglu & Ok 2005, Baillon et al. 2020).[9] In the Baseline-Equal and the Baseline-Unequal treatments this implies that $f(e_2, r) = 0$ because $e_2 = r$. The same occurs in the Bonus-Unequal treatments where the endowment of the second-mover is not affected by the roll of the die. Using this logic, equation (6) predicts that second-movers in the Bonus-Equal treatment return more than second-movers in the Baseline-Equal treatment. Second-movers will not behave any differently in the Bonus-Unequal treatment from the Baseline-Unequal treatment if the shock is not realized, given that $f(e_2, r) = 0$ in both treatments. If the reference point does not matter for the behavior of second-movers then$f(e_2, r) = 0$ and equations (4) and (6) are the same. In the Bonus-Unequal treatment, however, it holds that $f(e_2, r) = \eta\ (e_2 - r) \geq 0$ when the endowment of the second-movers has changed after rolling the die; in fact, there is a gain in utility for these second-movers who are lucky and see their endowment increase.

Prediction 1b. *If second-movers are inequality averse and have reference-dependent utility that uses the status quo (or the initial endowment) as a reference point, they will return more in the Bonus-Equal than in the Baseline-Equal treatment. They will send similar amounts in the Bonus-Unequal and Baseline-Unequal treatments.*

Next, we look at the behavior of first-movers. If first-movers are inequality averse, their behavior depends not only on their degree of inequality aversion ($\alpha_1 \geq 0$), but also on their beliefs about the inequality aversion of second-movers ($\alpha_2 \geq 0$). This can be seen from the maximization problem of inequality-averse first-movers:

(7) max $\quad u_i = \pi_i - \alpha_i \left(\pi_i - \pi_j\right)^2$

s.t $\quad y = E(y|X)$

where $\pi_1 = e_1 + X(3y - 1)$, $\pi_2 = f(e_2|\, r) + 3X(1 - y)$ and $y = E(y|X)$ denotes the expected return from second-movers.

To derive testable predictions, we consider two different possibilities. First, we assume that first-movers have altruistic preferences. Second, we consider the possibility of self-interested first-movers who expect reciprocal behavior from second-movers but try to maximize their own

[9] Our assumption departs from expectations-based theory in Kőszegi & Rabin (2006, 2007, 2009) or Dato et al. (2017) in that second-movers are not expected to use their *expected* endowment as a reference point. In section 3.3 we discuss how the different reference points (status-quo or expected endowment) lead to different predictions regarding the behavior of second-movers. We also show that our findings (and the ones in Bejarano et al. 2018)) are in line with our assumption that the initial endowment can be used as a reference point in the trust game (see also Appendix D). Overall, our findings are in line with the recent work of Baillon et al. (2020), where it is shown that expected-based references point receive little support, while the status quo is one of the most common reference points in risky environments.

payoff; i.e., first-movers who are self-interested maximize their utility subject to expecting a positive return from inequality-averse second-movers that is given by equations (4) or (6).[10]

Our idea of altruism follows Brülhart & Usunier (2012) in that we assume that altruistic first-movers do not expect any reciprocal behavior form second-movers ($E(y|X) = 0$). If we solve the maximization problem in equation (7) subject to this constraint we obtain that first-movers send a return $X = \frac{e_1 - e_2}{4} - \frac{1}{32\,\alpha_1}$ (see Appendix C for the details). This, in turn, implies that altruistic first-movers behave so as to reduce the existing inequalities and send more if their endowment is larger than the endowment of the second-movers.

Prediction 2a. *If first-movers are altruistic, they will send more in the Baseline-Unequal than in the Baseline-Equal treatment. Additionally, first-movers will send more in the Bonus-Unequal than in the Bonus-Equal treatment.*

Because second-movers may behave differently depending on whether or not they have reference-dependent utility, there may be a difference in the behavior of altruistic first-movers depending on whether or not they anticipate that second-movers will gain utility when a positive random shock is realized. If altruistic first-movers anticipate the gain in utility for second-movers when they experience a positive random shock, we expect them to send less to second-movers who received a positive shock than to second-movers who are initially given the same endowment as first-movers.[11] This, in turn, implies that we can predict the following behavior from first-movers:

Prediction 2b. *If first-movers are altruistic and believe that second-movers will obtain extra utility when the random shock is realized, first-movers will send less in the Bonus-Equal than in the Baseline-Equal treatment.*

A second possibility is that first-movers anticipate that second-movers are inequality averse but first-movers behave in a self-interested manner trying to maximize their expected payoff (Smith, 2011). Under this assumption, first-movers expect an optimal return $E(y|X) = y^*$ from first-movers in equilibrium, thus they will send more when they expect to receive more from second-movers. As in the case of altruistic first-movers, we expect differences in the behavior of self-

[10] Appendix C derives the predictions for the case in which first-movers are inequality averse and expect for second-movers to be inequality averse. We show that the amount sent by first-movers is decreasing in the degree of inequality aversion of second-movers, α_2.

[11] This is because $\pi_2 = e_2 + f(e_2, r) + 3X(1-y)$ thus this prediction for altruistic first-movers follows from solving the maximization problem in equation (7) subject to $E(y|X) = 0$. As we show in Appendix C, the amount to be sent by first-movers in this case is $X = \frac{e_1 - e_2}{4} - \frac{1}{32\,\alpha_1} - \frac{\eta\,(e_2 - r)}{4}$.

interested first-movers depending on whether or not they anticipate that second-movers will gain in utility after the occurrence of the positive random shock. If first-movers are self-interested and expect no gain in utility, they will maximize their utility subject to the optimal return of second-movers being given by $y^* = \frac{2}{3} - \frac{1}{24\,X\,\alpha_2} + \frac{e_2 - e_1}{6X}$ in equation (4). As a result, the behavior of first-movers will be the same in the Baseline-Equal and the Bonus-Equal treatment. If first-movers expect the gain in utility of second-movers, then they will maximize their utility subject to the optimal return in equation (6) $y^* = \frac{2}{3} - \frac{1}{24\,X\,\alpha_2} + \frac{e_2 - e_1}{6X} + \frac{\eta\,(e_2 - r)}{6X}$. Because self-interested first-movers anticipate that second-movers will be more likely to reciprocate after the occurrence of the positive random shock, they will send more in the Bonus-Equal than in the Baseline-Equal treatment.

Prediction 3a. *If first-movers are self-interested and anticipate that second-movers are inequality averse, they will send more in the Baseline-Equal than in the Baseline-Unequal treatment. Additionally, first-movers will send more in the Bonus-Equal than in the Bonus-Unequal treatment.*

Prediction 3b. *If first-movers are self-interested and anticipate that second-movers will be more likely to reciprocate when the random shock is realized, they will send more in the Bonus-Equal than the Baseline-Equal treatment.*

Overall, our predictions imply that models of inequality aversion can be used to rationalize differences in the behavior of first and second-movers between the equal and unequal treatments (Predictions 1a, 2a, 3a). However, these models cannot be reconciled with the data if we observe differences in behavior of first- and second-movers between the Baseline-Equal and the Bonus-Equal treatments, which could be explained incorporating the idea of reference-dependent utility and theories of affect (Predictions 1b, 2b, 3b). The comparison between predictions 2a and 3a and between 2b and 3b will shed light on whether the driving force for the first-movers' behavior is altruism or strategic.[12]

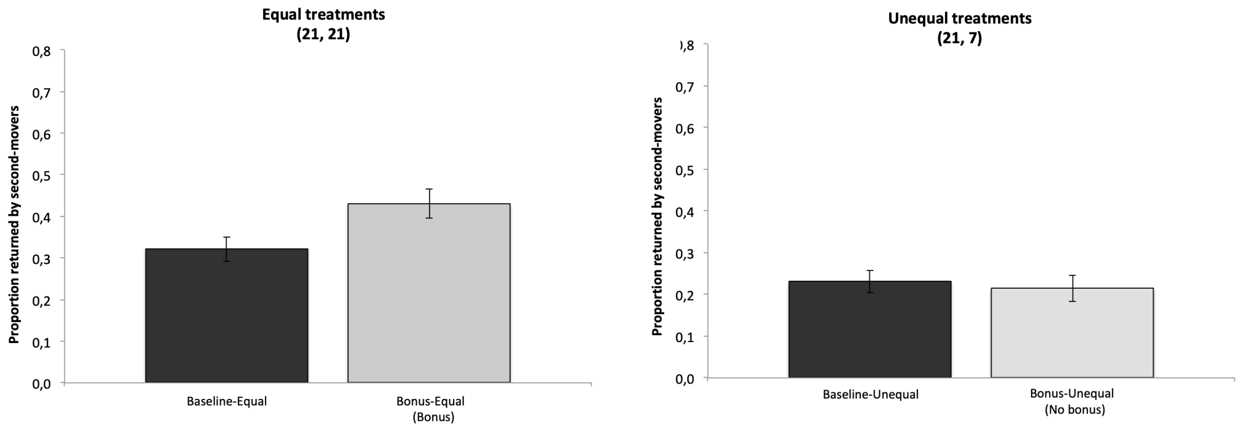
[12] Note that our predictions imply that first-movers can anticipate the effect of the random positive shock in the behavior of second-movers. As a result, first-movers who are altruistic and inequality-averse will send less to second-movers who are lucky and experience the positive random shock, while self-interested first-movers will send more to lucky second-movers (e.g., because they expect a higher return from them). However, it is also possible that first-movers are not able to anticipate the behavior of second-movers after the realization of the random shock.

3. Results

3.1. Behavior of second-movers

We start by considering the behavior of second-movers by looking at the share of the available funds returned by second-movers; i.e., the return ratio. The left-hand-side panel of Figure 1 displays the average return ratio where first and second-movers have the same endowments (Equal treatments). The right-hand-side panel of Figure 1 displays the average return ratio in treatments where first-movers have a higher endowment than second-movers (Unequal treatments). The descriptive statistics and the distributions of the return ratio are presented in Appendix B.[13]

Figure 1. Proportion returned by second-movers



Note: Error bars reflect standard errors of the mean

We perform non-parametric analyses to compare the behavior of second-movers across treatments using the Mann-Whitney test and the robust rank-order test (Fligner & Pollicello 1981, Feltovich 2003). Table 1 summarizes the results.

[13] This includes the correlation coefficient between the proportion of the funds returned by second-movers and the amount they received from first-movers in each of the treatments. This has been used as a measure of reciprocity in other articles (e.g., Berg et al. 1995, Chaudhuri & Gangadharan 2007, Calabuig et al. 2016). Our results suggest that in the correlation coefficients are insignificant in the equal treatments ($p > 0.114$), but these are positive and significant in the unequal treatments ($p < 0.001$).

Table 1. Non-parametric analysis for the share returned by second-movers

	Mann-Whitney test	Robust rank-order test
Baseline-Equal *vs* Baseline-Unequal	2.189 *	2.249 *
Bonus-Equal *vs* Bonus-Unequal	4.349 ***	5.116 ***
Baseline-Equal *vs* Bonus-Equal	1.985 *	2.029 *
Baseline-Unequal *vs* Bonus-Unequal	0.659	0.649

Notes: We report the Z-scores for both tests. Significance at *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$ level (for two-tailed analysis). The results are robust if we adjust for multiple comparisons using the Holm-Bonferroni correction or the procedure in List et al. (2019).

Our findings for second-movers are consistent with the hypothesis of inequality aversion leading to Prediction 1a. Second-movers return a lower proportion of the generated funds in the Unequal treatments (where they have a smaller endowment than the first-mover), compared with the Equal treatments (where they have the same endowment as the first-mover).[14] This occurs both in the Baseline treatments where the inequality is initially given (Baseline-Equal *vs* Baseline-Unequal: $p < 0.028$) as well as in the Bonus treatments where the endowment of the second-mover is increased (Bonus-Equal *vs* Bonus-Unequal, $p < 0.001$).[15]

Result 1. *Second-movers return less if there is inequality in favor of the first-mover. Second-movers return less in the Baseline-Unequal than in the Baseline-Equal treatment. Second-movers also return less in the Bonus-Unequal than in the Bonus-Equal treatment.*

With regards to our main research question the results for second-movers suggest that the occurrence of the random positive shock influences reciprocal behavior, as second-movers return significantly more when their endowment is increased in the Bonus-Equal treatment, compared with the Baseline-Equal treatment (0.43 *vs* 0.32) ($p < 0.047$). Thus, we find support for our Prediction 1b that the occurrence of the positive random shock will increase the level of trustworthiness.

[14] One idea for reciprocity is that first-movers retrieve what they have invested, what occurs if second-movers return at least one third of the available funds (Coleman 1990, Chaudhuri & Gangadharan 2007, Ciriolo 2007, Rodriguez-Lara 2018). The results of the Wilcoxon signed-rank test suggest that second-movers return significantly less than one third in the Unequal treatments ($p = 0.002$).

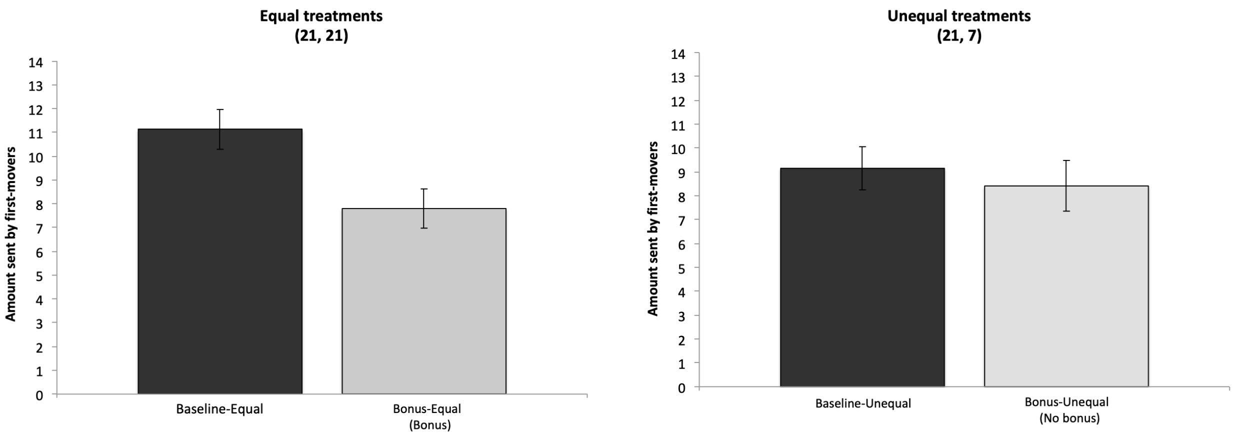
[15] When we compare the Baseline-Equal *vs* Baseline-Unequal using the Wilcoxon signed-rank test we obtain $p = 0.028$, while $p = 0.012$ using the robust rank-order test. We therefore report that $p < 0.028$ for this comparison. We follow the same logic and report the highest p-value for pairwise comparisons when differences are significant. If differences are not, then we report the smallest p-value.

Result 2. *The positive random shock that increases their endowment – and eliminates the existing inequality – causes second-movers to return more in the Bonus-Equal than in the Baseline-Equal treatment.*

3.2. Behavior of first-movers

Next, we investigate the behavior of first-movers by looking at the amount sent in each treatment. The main findings are presented in Figure 2 and Table 2.

Figure 2. Amount sent by first-mover



Note: Error bars reflect standard errors of the mean.

Table 2. Non-parametric analysis for the amount sent by first-movers

	Mann-Whitney test	Robust rank-order test
Baseline-Equal *vs* Baseline-Unequal	1.969 *	1.973 *
Bonus-Equal *vs* Bonus-Unequal	0.141	0.138
Baseline-Equal *vs* Bonus-Equal	3.129 **	3.302 ***
Baseline-Unequal *vs* Bonus-Unequal	1.066	1.042

Notes: We report the Z-scores for both tests. Significance at *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$ level (for two-tailed analysis). The results are robust if we adjust for multiple comparisons using the Holm-Bonferroni correction or the procedure in List et al. (2019).

When we compare the behavior in the Baseline-Equal and the Baseline-Unequal treatments, we find that first-movers send significantly more in the former treatment (11.13 *vs.* 9.15) ($p < 0.049$). There is no significant difference in the behavior of first-movers in the Bonus-Equal and the

Bonus-Unequal treatments (7.80 *vs.* 8.42) (p = 0.889). These findings are more in line with Prediction 3a than Prediction 2a suggesting that self-interest plays a more prominent role in first-mover behavior than inequality aversion.

Result 3. *First-movers send less in the Baseline-Unequal than in the Baseline-Equal treatment.*

With regards to our main research question, we find that first-movers send significantly more in the Baseline-Equal than in the Bonus-Equal treatment (11.13 *vs.* 7.80) ($p < 0.002$) suggesting that the *source* of the endowment of second-movers matters for the behavior of first-movers.

Result 4. *First-movers send less in the Bonus-Equal than in the Baseline-Equal treatment.*

Result 4 seems to be more in line with Prediction 2b than Prediction 3b, suggesting that in this context first-movers' behavior is mostly driven by considerations involving inequality aversion. This finding is at odds with Result 3 where we observed that self-interest plays a more prominent role than inequality aversion in the behavior of first-movers. It appears that the existence of the (possibility of the) shock changes the first movers' motivation.

3.3. On the use of the initial endowment as a reference point

One important assumption of our model is that second-movers use their initial endowment as a reference point. This assumption follows from the status-quo theory but it is in sharp contrast with the possibility that second-movers use their *expected* endowment as a reference point (Kőszegi & Rabin, 2006, 2007, 2009, Dato et al. 2017). While we are not particularly interested in discussing the exact reference point that second-movers employ when choosing their return, we briefly discuss in this section how these two reference points (i.e., initial or expected endowment) lead to different predictions regarding the behavior of second-movers.[16] In this section, we also provide experimental evidence that is in line with our assumption that second-movers use their initial endowment as a reference point (see Appendix D for further details).

[16] We are thankful to one of the referees for suggesting this analysis. The interested readers on the formation of reference points can consult, among others, Terzi et al. (2016), Baillon et al. (2020), Buchanan (2020) or Bejarano et al. (2021). For theoretical models see, among others, Kőszegi & Rabin (2006, 2007, 2009), Masatlioglu & Ok (2005), Masatlioglu & Uler (2013), Masatlioglu & Raymond (2016), or Dato et al. (2017). One important feature that makes our paper divert from some of these studies is that we consider a setting in which the realization of the shock takes place before players make their choices.

First, recall that the optimal return for second-movers who have reference-dependent utility is given by equation (6) $y^* = \frac{2}{3} - \frac{1}{24\, X\, \alpha_2} + \frac{e_2 - e_1}{6X} + \frac{f(e_2,r)}{6X}$, where the value of $f(e_2, r)$ depends on whether or not the final endowment of the second-mover is above or below a reference point (r). In particular, we assume that $f(e_2, r) = \eta\,(e_2 - r)$ if $e_2 \geq r$, while $f(e_2, r) = \eta\lambda\,(e_2 - r)$ if $e_2 < r$.

A direct consequence from assuming that second-movers use their initial endowment as a reference point is that second-movers do not experience any loss in utility if a bad outcome is realized. This leads to our prediction 1b that second-movers will return more in the Bonus-Equal than the Baseline-Equal treatment, but their behavior will be indistinguishable in the Bonus-Unequal and the Baseline-Unequal treatment. Suppose instead that we allowed for second-movers to use their *expected* endowment as reference point. Then, any bonus that is not realized in the Bonus-Unequal would be perceived as a loss for second-movers, because their final endowment (7 E$) will be below their reference point (14 E$). Similarly, any bonus that is realized in the Bonus-Equal treatment would be treated as a gain because their final endowment (21 E$) will be above their reference point (14 E$). This, in turn, would imply that second-movers who employ the expected endowment as a reference point would be expected to return less in the Bonus-Unequal compared with the Baseline-Unequal, because of the loss in utility $f(e_2, r) = \eta\lambda\,(e_2 - r) < 0$ in the former treatment (note that $f(e_2, r) = 0$ in the Baseline-Unequal treatment because $r = e_2$).

But what is the reference point that second-movers use? To assess the aforementioned options, we look at the behavior of second-movers in Figure 1 and Table 1. Our data suggest that second-movers return more in the Bonus-Equal than in the Baseline-Equal treatment (0.43 *vs* 0.32, $p <$ 0.047), but their behavior Baseline-Unequal is not statistically different from their behavior in the Bonus-Unequal (0.23 *vs* 0.21, $p = 0.51$). These findings lend support for our assumption that the initial endowment of second-movers (and not their expected endowment) may serve as a reference point to them.

One interesting question would be to determine whether second-movers also use their initial endowment as a reference point when negative random shocks are possible. To examine this possibility we look at data reported in Bejarano et al. (2018) and additional data that we collected after their paper was published. In Bejarano et al. (2018), second-movers start out with the same endowment as first-movers (21 E$) but a negative random shock (i.e., the outcome of a die roll) can decrease their initial endowment. In particular, second-movers keep her initial endowment of 21 E$ if the outcome of the die is even (Shock-Equal) but their endowment is reduced to 7 E$ if the outcome of the die is odd (Shock-Unequal). We report in Table 3 the observed return of second-movers in each treatment condition (see Appendix D for the non-parametric analysis and results on the behavior of first-movers).

Table 3. Summary statistics for the return of second-movers when positive and negative random shocks are possible.

Treatment	N	Initial endowments	Final endowments	Mean	Std. Dev.	%return nothing
Baseline-Equal	53	(21, 21)	(21, 21)	0.32	(0.21)	0.11
Baseline-Unequal	52	(21, 7)	(21, 7)	0.23	(0.19)	0.22
Bonus-Equal (Bonus)	45	(21, 21)	(21, 21)	0.43	(0.25)	0.06
Bonus-Unequal (No bonus)	54	(21, 7)	(21, 7)	0.21	(0.21)	0.20
Shock-Equal (No shock)	44	(21, 21)	(21, 21)	0.35	(0.25)	0.13
Shock-Unequal (Shock)	43	(21, 7)	(21, 7)	0.18	(0.19)	0.33

Note. N refers to the number of second-movers in each treatment that received a positive amount from first-movers and then could decide how much to return.

In line with our previous discussion, we find that second-movers return less when they experience a negative random shock that decreases their endowment; in fact, the frequency of second-movers who return nothing is the highest in the Shock-Unequal treatment. This observed behavior would be in line both with the possibility that second-movers use their initial endowment or their expected endowment as a reference point. In order to see which assumption best fits the data we need to look at the behavior of second-movers who do not experience the negative random shock. In this case the use of the initial endowment as a reference point would predict no difference in the behavior of second-movers who do not experience the negative shock in the Shock-Equal treatment, compared with their behavior when they receive the same endowment as the first-mover in the Baseline-Equal treatment. This is because the endowment of second-movers is unaffected if the shock is not realized, and second-movers are expected to use their initial endowment as a reference point. Arguably the use of the expected endowment as a reference point would imply that second-movers will return more when a negative random shock is possible but not realized because their final endowment (21 E$) will be above their expected endowment (14 E$); in fact, theories of affect may predict that second-movers who do not experience the negative shock may feel that that they have been lucky, thus they may be more willing to reciprocate in the Shock-Equal than in the Baseline-Equal treatment. Bejarano et al. (2018) find that the behavior of second movers who do not experience the negative random shock is not statistically different from their behavior when they receive initially the same endowment as the first-mover (0.35 *vs* 0.32, $p = 0.94$). As a result, we find no supportive evidence for the assumption that the expected endowment of the second-mover serves a reference point to them when negative random shocks are possible. Instead, we find support for our assumption that second-movers use their initial endowment as the reference point.

4. Conclusion

This paper investigates whether (and how) different distributions of wealth influence the levels of trust and trustworthiness when we vary the *source* of the distribution. In addition to testing whether relatively rich people trust relatively poorer people more or less than they trust others with the same wealth as themselves, our primary interest is to test whether people exhibit the same trusting behavior towards "originally rich" and "newly rich" people. In the process of answering these questions we also study *i*) how the occurrence of the random positive shock affects the level of trustworthiness of those who are affected by the positive random shock, and *ii*) whether people who experience the shock use their initial endowment as a reference point.

We consider a variation of the trust game in which the occurrence of positive random shocks (i.e., the outcome of a die roll) can eliminate an existing inequality (in favor of the first-mover) by increasing the endowment of the second-mover. Our results suggest that first-movers *i*) trust second-movers with the same endowment as themselves *more* than relatively poorer second-movers, but *ii*) trust second-movers who are lucky and obtain the same endowment as the first-mover after the occurrence of a positive random shock *less* than second-movers who had the same endowment from the outset. As for the level of trustworthiness, our results suggest that second-movers *i*) are *less* trustworthy when they have a relatively lower endowment than first-movers, and *ii*) they are *more* trustworthy after having been lucky and experiencing a positive random shock that increases their endowment. These findings are consistent with previous evidence suggesting that the distribution of wealth is important in explaining behavior in the trust game (e.g., Ciriolo 2007, Lei & Vesely 2010, Xiao & Bicchieri 2010, Smith 2011, Brülhart & Usunier 2012, Hargreaves-Heap et al. 2013, Calabuig et al. 2016). However, we add a new perspective to the existing literature by showing that it is also important to take the *source* of the distribution into account. In particular, we show that second-movers behave differently depending on whether they originally have the same endowment as first-movers or this equality is the result of a random positive shock. Our finding that second-movers are more trustworthy in the latter case is in line with theories of affect (Loewenstein 2005, Lerner et al. 2015, George & Dane 2016) and the possibility that good luck and positive emotions foster pro-social behavior (Capra 2004, Kidd et al. 2013, Matarazzo et al. 2020). From a theoretical perspective, these results call for modeling the behavior of second-movers in the trust game using the idea of inequality-aversion, reference-dependent utility and theories of affect. In this regard, our data suggest that second-movers can use their initial endowment (and not their expected endowment) as a reference point when choosing their return.

While our results for second-movers are roughly consistent with theories involving inequality aversion, reference-dependent utility and theories of affect, our finding that people trust less to those who are lucky is puzzling. In the current scenario with the COVID19 pandemic, our experimental evidence suggest that people will trust less to those companies that used to be *poor* but have been positively affected by the random shock. As a policy implication, they also suggest that if a government decides to implement lump-sum transfers aimed at reducing inequality, these transfers could have a potential spillover effect increasing the level of reciprocity of those who receive them. On the other hand, these transfers could also diminish feelings of trust towards those who have received the transfers. Hence, our findings point out that positive random shocks can be detrimental for the level of trust and can damper economic exchange, as a result.

From a behavioral perspective, our findings for first-movers warrant a discussion. We posit that if first-movers are altruistic and care about the inequality they should send more to second-movers who have a lower endowment, which is not observed in our data. If first-movers behavior is driven by self-interest we would expect them to send more to those who have experienced a positive random shock, since it seems quite likely that a second-mover who has just experienced an increase in their endowment will return a higher share of the available funds. Instead, we find the opposite in first-movers. How can reconcile these findings?

One possible explanation is that first and second-movers have different reference points. It may be possible that second-movers who experience the random negative shock respond to the shock by returning more but first-movers do not anticipate this behavior; e.g., because the effects of the shock are more salient to second-movers. If that were the case, however, one would expect no effect of the shock on the behavior of first-movers. Arguably, first-movers react to the shock by sending *less* to lucky second-movers. A recent paper by Buchanan (2020) suggests that people cannot predict how others will behave because they fail to anticipate the reference point of others. Cox et al. (2008, 2016), Chaudhuri & Gangadharan (2007) or Houser et al. (2008), among others, highlight that altruism, expectations and intentions are likely to influence behavior; in fact, it is possible that the willingness to return depend on the opportunity set of the second-mover who can use the amount received relative to their endowment (or the occurrence of the shock) as a reference point. We believe that a fruitful area for future research would be to elicit the reference point of first-and second movers as well as their beliefs regarding the levels of trust and trustworthiness when random shocks are possible. These findings can be useful when modelling the behavior of first and second-movers in the trust game. We should acknowledge this as a limitation of the current study.

An alternative explanation would be that first-movers hold motivated beliefs; i.e., they interpret the occurrence of the shock in a self-serving manner so as to act egoistically (see Gino et al. 2016 for a recent revision on motivated beliefs). With that in mind, first-movers are altruistic or self-interested depending on the source of the inequality. If shocks are not possible first-movers expect second-movers to be inequality-averse. As a result, first-movers send less to second-movers with a lower endowment; i.e., they act in a self-interested manner. The occurrence of the positive random shock makes the issue of inequality-aversion more salient and makes the behavior of first-movers more influenced by notions of altruism. Seeing the second-mover experiencing a positive random shock makes the idea that second-movers do not deserve any more money more prominent. As a result, first-movers decide to send less to second-movers who have experienced a positive random shock.[17]

The idea that first-movers are self-serving in the interpretation of the shock to act egoistically is consistent with the recent findings in Bejarano et al. (2018) where negative random shocks can occur in the trust game. In their setting, first-movers send less to second-movers who experience the negative random shock, possibly because they expect to receive less from them in return. If a negative shock occurs to second-movers, first-movers anticipate that second-movers will reciprocate less, *but* if a positive random shock occurs to second-movers, they do not behave in a way that is consistent with expecting a higher return from second-movers. Instead, first-movers may believe that there is already a mechanism that eliminated the inequality thus they do not need to compensate second-movers who experienced the positive random shock.

The possibility of motivated beliefs is also consistent with evidence from redistribution problems suggesting that people choose different allocations depending on whether or not random shocks affected their production (Rodriguez-Lara & Moreno-Garrido 2012, Deffains et al. 2016). In a recent paper, Bejarano et al. (2021) examine how changes in economic conditions can affect the productivity of workers in a gift-exchange game. They show that employers are reluctant to increase wages during expansions but they do cut wages during recessions. Their interpretation of the data is that employers are self-serving, thus they do not compensate workers sufficiently when the economy is growing and productivity levels increase.

[17] In a way, we examine the behavior of first- and second-movers in isolation. Our data could be interpreted as evidence that first-movers are not be able to anticipate the behavior of second-movers after the realization of the random shock, but it is also possible that first-movers do anticipate the behavior of second-movers but they hold motivated beliefs and interpret the realization of the shock in a self-serving manner to act egoistically.

Our research opens up other interesting avenues for future research as well. For example, there is overwhelming evidence that people respond differently to inequalities that result from a random process and those that result from choices or merit, for instance in the context of redistribution (Konow 2000, Cherry et al. 2002, Alesina & Angeletos 2005, Cappelen et al. 2007, 2013, Krawczyk 2010, Rodriguez-Lara & Moreno-Garrido 2012, Durante et al. 2014, Mollerstrom et al. 2015, Deffains et al. 2016, Tinghög et al. 2017, Jimenez-Jimenez et al. 2018, Akbaş et al. 2019). Thus, it may be worth investigating how trust and trustworthiness are affected by random shocks when the initial endowments can be determined by luck or affected by performance in a real-effort task. A relevant paper within this line of research is Fehr et al. (2018). They explore how inequality affects the behavior in the trust game when participants receive different endowments depending on their performance in a real-effort task. Fehr et al. (2018) find that induced inequality affects the levels of trust and trustworthiness depending on the extent to which this is deemed fair by participants. They do not consider the possibility of random shocks. The current experiment suggests it may be worth considering a setting with real-effort and random shocks.

Acknowledgments

We are grateful to the staff and the graduate students at the Economic Science Institute (ESI) at Chapman University for their help in administering the sessions. This research was funded by the International Foundation of Research in Experimental Economics (IFREE) and the Research Facilitation Funding (RFF) at Middlesex University London. Ismael Rodriguez-Lara acknowledges financial support from the Ministerio de Innovación, Ciencia y Universidades (Spain) under the research project PGC2018-097875-A-I00. The paper has benefited from suggestions provided by seminar and conference participants at the Universidad de Granada, 2018 ESA North America (Guatemala), 2019 Simposio de Análisis Económico (Alicante), and the 2020 ESA Global Online Around-the-Clock Meetings.

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When rich do (not) trust the (newly) rich: Experimental evidence on the effects of positive random shocks in the trust game

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Appendix

Appendix A: Experimental Instructions

Appendix B: Additional Results

Appendix C: Optimal behavior of first-movers (if they are inequality-averse)

Appendix D: Positive and negative shocks that affect the endowment of second-movers

Appendix A

Experimental instructions: Baseline-Equal treatment[1]

ID: _____ **A**

Welcome to the experiment!

You are about to participate in a decision making experiment. You will be able to earn money in this experiment. How much you earn depends on your decisions and on the decisions of other participants in the experiment.

In this experiment there are two types of players. We call them A and B. Each player A will be randomly matched with a player B in the other room.

Everybody in this room has been randomly assigned to be **player A**

Except for the type of players, instructions are the same for both player A and B. Every player A and B will receive an envelope with 21 Experimental Dollars E$. Players A get to decide first. Each A will have to decide how much of their initial E$ – some, all, none of it – to send to the paired B. Each E$ sent to player B will be tripled. For example (and the numbers used in these examples are picked for clarification purposes only), if player A sends 2 E$ to the player B he/she is matched with, B will receive 6 E$. If a player A sends 9E$ to his/her paired player B, B will receive 27 E$.

Players B will subsequently have to decide how many E$ to send back to their paired player A, keeping the remainder amount. For example (and again the numbers used in these examples are picked for clarification purposes only), if A sends 2 E$ to B, B will receive 6 E$. If B decides to return 5 E$, A will end up with 24 E$ (21 – 2 + 5), B with 22 (21 + 6 – 5). If Player A sends 9 E$ to B, B will receive 27 E$. If B decides to return 15 E$, A will end up with 27 E$ (21 – 9 + 15) and B with 33 (21 + 27 – 15).

Summarizing, the number of E$ will be computed as follows:
E$ Player A = 21 E$ –E$ sent to B + E$ received from B
E$ Player B = 21 E$ + 3x E$ received from A – E$ sent to A

E$ will be converted to actual dollars at the end of the experiment (1 E$ = $0.5).

Please do not talk with the other participants during the experiment. If you need any help, or have difficulties understanding the instructions, please raise your hand and ask the instructor privately. It is important that you understand the instructions before we start.

[1] These are the original instructions for the first-mover (Player A) in the Baseline-Equal treatment. The second-mover (Player B) receives the exact same instructions, except for the role. In the Baseline-Unequal treatment, we only change the amount that corresponds to the endowment of the second-mover.

Experimental Procedure and Records

1. You will find an envelope with your experimental ID and 21 E$. Please write down the same number on this sheet.
2. For each person in this room, we will draw a number from an urn with all the experimental IDs of players B in the other room. This number is the experimental ID of your paired player B. Neither you nor we will ever know more than his/her experimental ID.
3. Choose how many E$ bills to send to your paired player B and keep the rest with you. Leave the E$ you want to send in the envelope.
4. In the first column of **Decision Records Table**, write the number of bills you want to send.
5. We will collect all the envelopes in this room. E$ contained in the envelopes will be multiplied by 3 and added back.
6. Your envelope will be given to the player B with the ID number randomly assigned to you.
7. Player B will count the E$ that he/she receives and will decide how many E$ to send back to you.
8. The envelopes will be collected and returned back to you with the amount B chooses to return.
9. Count the bills that you received inside the envelope.
10. In the second column of **Decision Records Table**, write the number of bills you received from Player B. Put all your E$ in the envelope with your ID.
11. We will collect all envelopes in the room, and call you to exchange E$ for U$S dollars. You should present this record sheet to be paid.

Decision Records Table

A My ID___	My B's ID___
I sent	I received back

Experimental instructions: Bonus treatments

Welcome to the experiment!

You are about to participate in a decision making experiment. You will be able to earn money in this experiment. How much you earn depends on your decisions and on the decisions of other participants in the experiment.

In this experiment there are two types of players. We call them A and B. Each player A will be randomly matched with a player B in the other room.

Everybody in this room has been randomly assigned to be **player A**

Except for the type of players, instructions are the same for both player A and B. Every player A will receive an envelope with 21 Experimental Dollars E$. Every player B will receive *initially* an envelope with 7 E$. Players A get to decide first. Each A will have to decide how much of their initial E$ – some, all, none of it – to send to the paired B. Each E$ sent to player B will be tripled. For example (and the numbers used in these examples are picked for clarification purposes only), if player A sends 2 E$ to the player B he/she is matched with, B will receive 6 E$. If a player A sends 9E$ to his/her paired player B, B will receive 27 E$.

Before player A makes a decision about the number of E$ to send we will roll a die in front of each player A. If the number is odd (1, 3, or 5), the amount of E$ in the envelope of the player B to whom player A will be paired will be increased by 14 E$. As a result the player B to whom player A will be matched with will have an envelope with 21 E$ instead of the original 7 E$. If the number is even (2, 4, or 6), the player B to whom player A will be paired keeps 7 E$ in his/her envelope.

Players B will subsequently have to decide how many E$ to send back to their paired player A, keeping the remainder amount. Players B will learn the outcome of the die and the amount of E$ sent by player A before making his/her decision. For example (and again the numbers used in these examples are picked for clarification purposes only), if the increase took places (i.e, the number was odd) and A sends 2 E$ to B, B will receive 6 E$. If B decides to return 5 E$, A will end up with 24 E$ (21 – 2 + 5), and B with 22 E$ (7+ 14 + 6 – 5). If the increase did not take place (i.e., the number was even), and A sends 2 E$ to B, B will receive 6 E$. If B decides to return 5 E$, A will end up with 24 E$ (21 – 2 + 5), and B with 8 E$ (7 + 6 – 5).
Similarly, if player A sends 9 E$ to B, B will receive 27 E$. If B decides to return 15 E$, A will end up with 27 E$ (21 – 9 + 15) and B with 19E$ (7+ 27 – 15) or 33E$ (21 + 27 – 15) depending on whether E$ are increased or not from their initial endowment

Summarizing, the number of E$ will be computed as follows:
E$ Player A = 21 E$ –E$ sent to B + E$ received from B

E$ B = 7E$ + 14 (Increase, if applicable) + 3x Points received from A – Points sent to A

Remember that when players A make their decision about how many E$ to send, once he/she knows whether the increase of B's initial amount took place or not.
E$ will be converted to actual dollars at the end of the experiment (1 E$ = $0.5).

Please do not talk with the other participants during the experiment. If you need any help, or have difficulties understanding the instructions, please raise your hand and ask the instructor privately. It is important that you understand the instructions before we start.

Experimental Procedure and Records

1. You will find an envelope with your experimental ID and 21 E$. Please write down the same number on this sheet.
2. For each person in this room, we will draw a number from an urn with all the experimental IDs of players B in the other room. This number is the experimental ID of your paired player B. Neither you nor we will ever know more than his/her experimental ID.
3. We will roll a die in front of you and the result will determine if E$ are increased (odd numbers: 1, 3, or 5) or not (even numbers: 2, 4, or 6) from the initial 7 E$ of the player B you are matched with. In the first column of **Decision Records Table**, write the result of the die and whether initial $E are reduced for the player B you are matched with.
4. Choose how many E$ bills to send to your paired player B and keep the rest with you. Leave the E$ you want to send in the envelope.
5. In the envelope, you will find an **outcome card** like this:

Message from player A to player B:
1) I have been matched with player B's ID _______
2) You had a 50% probability of getting your original amount increased with 14 $E.
3) The number on the die was _____
4) Your original amount of 7 $E was (increased / not increased) from 7E$ to 21$E.

   Please write the outcome of the die and underline the appropriated sentence (increased/not increased). Put the outcome card back to the envelope.
6. In the first column of **Decision Records Table**, write the number of bills you want to send.
7. We will collect all the envelopes in this room. E$ contained in the envelopes will be multiplied by 3 and added back.
8. Your envelope and the message will be given to the player B with the ID number randomly assigned to you.
9. Player B will count the E$ that he/she receives and will decide how many E$ to send back to you.
10. The envelopes will be collected and returned back to you with the amount B chooses to return.
11. Count the bills that you received inside the envelope.
12. In the second column of **Decision Records Table**, write the number of bills you received from Player B. Put all your E$ in the envelope with your ID.

13. We will collect all envelopes in the room, and call you to exchange E$ for U$S dollars. You should present this record sheet to be paid.

Decision Records Table

A My ID___	My B's ID___
The number in the die was ______ B's initial $E are increased? Y / N	
I sent	I received back

Appendix B

Amount sent by first-movers. Figure B.1 displays the distributions of the amount sent by first-movers in each of the treatments. We set the number of bins to 21 (i.e., width equals to 1). Table B.1 shows descriptive statistics.

Figure B.1. Amount sent by first-movers in each treatment

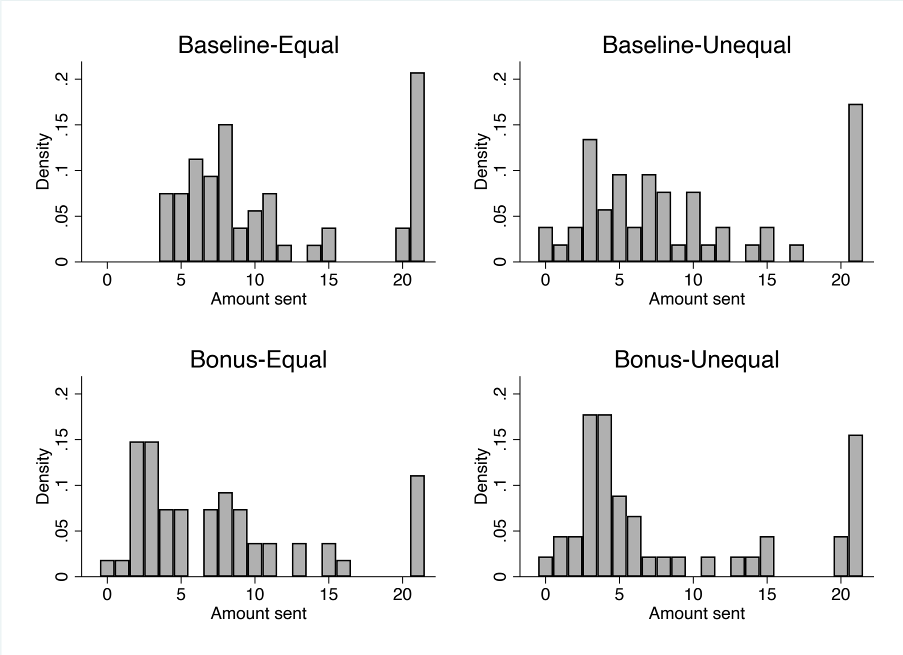


Table B.1. Amount sent by first mover

	Endowment	N	Mean	Std. Dev.	%send nothing	Min	Max
Baseline-Equal	(21, 21)	53	11.13	(6.13)	0	4	21
Bonus-Equal	(21, 21)	54	7.80	(6.08)	0.03	0	21
Baseline-Unequal	(21, 7)	52	9.15	(6.65)	0.04	0	21
Bonus-Unequal	(21, 7)	45	8.42	(7.14)	0.02	0	21

Note: N refers to number of first-movers in each treatment.

Share returned by second-movers. Figure B.2 displays the distributions of the share returned by second-movers in each of the treatments. We set the number of bins to 20 (i.e., width equals to 0.05). Table B.2 shows descriptive statistics.[2] This includes the Spearman correlation coefficient between the amount received by second-movers and they proportion they return to first-movers.

Figure B.2. Share returned by second-movers in each treatment

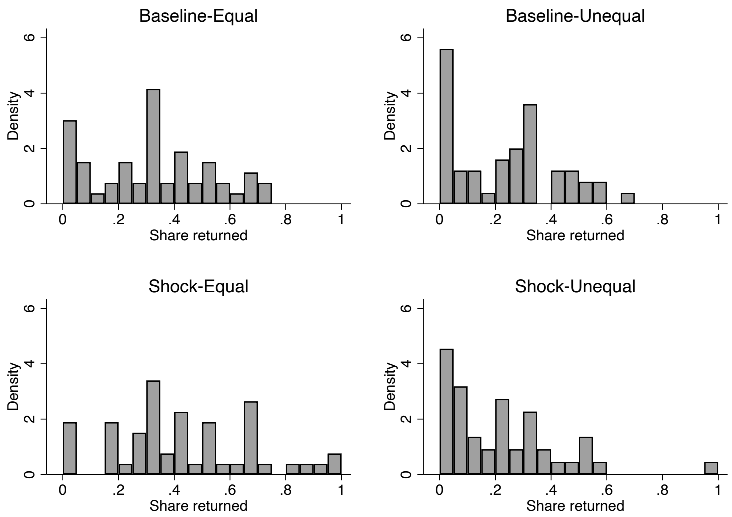


Table B.2. Share of available funds returned by the second-movers

	Endowment	N	Mean	Std. Dev.	%return nothing	Min	Max	Corr.
Baseline-Equal	(21, 21)	53	0.32	(0.21)	0.11	0	0.75	- 0.02
Bonus-Equal	(21, 21)	53	0.43	(0.25)	0.06	0	1	-0.22
Baseline-Unequal	(21, 7)	50	0.23	(0.19)	0.22	0	0.67	0.47***
Bonus-Unequal	(21, 7)	44	0.21	(0.21)	0.20	0	1	0.53***

Note: N refers to the number of second-movers in each treatment that received a positive amount from first-movers and then could decide how much to return. Significance at *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$ level (for two-tailed analysis).

[2] We note that there is a second-mover who returns more than what she received in the Shock-Equal treatment. We code this observation as share return equals to 1 but all our results are robust if we do not constraint this observation.

Appendix C

We develop the predictions of the model for the case in which first-movers are inequality averse, depending on their expected return from second-movers. Recall that first-movers maximize:

$$\begin{array}{ll} \max & u_i = \pi_i - \alpha_i \left(\pi_i - \pi_j\right)^2 \\ \text{s.t} & y = E(y|x) \end{array}$$

where $\pi_1 = e_1 + X(3y-1)$, $\pi_2 = e_2 + 3X(1-y)$ and $y = E(y|x)$ denotes the expected return from second-movers.

Case 1. First-movers are altruistic

Consider the case in which first-movers expect to receive nothing back from second-movers $(E(y|x) = 0)$. In this case, an altrusitc first-mover who is inequality averse will behave so as to reduce inequalities. To see this it is worth noting that

(C1) $\pi_1 - \pi_2 = e_1 + X(3y-1) - e_2 - 3X(1-y) = e_1 - e_2 + 3yX - X - 3X + 3Xy = e_1 - e_2 + 6yX - 4X$

Thus, the first-mover solves:

$$\begin{array}{ll} \max & u_1 = e_1 + X(3y-1) - \alpha_1 \left(e_1 - e_2 + 6yX - 4X\right)^2 \\ \text{s.t} & y = E(y|x) = 0 \end{array}$$

If we replace the value of *y* into the utility function of the first-mover:

$$u_1 = e_1 - X - \alpha_1 \left(e_1 - e_2 - 4X\right)^2$$

Taking derivatives with respect to the amount to send we obtain the first-order condition:

$$-1 - (2\,\alpha_1)(-4)(e_1 - e_2 - 4X) = 0$$

$$8\,\alpha_1(e_1 - e_2 - 4X) = 1$$

After doing some algebra we derive the amount to be sent by first-movers:

$$X = \frac{e_1 - e_2}{4} - \frac{1}{32\,\alpha_1}$$

As a result, first-movers who are inequality averse will trust more when they are richer and second-movers are poorer; i.e., the difference in the endowment $(e_1 - e_2)$ has a positive effect on the amount that first-movers send to second-movers (Prediction 2a). In this context, it is also important to account for the degree of inequality aversion of first-movers (α_2).

In principle, we can also derive the behavior of first-movers who are altruistic, but anticipate that second-movers will obtain an extra utility when the random shock is realized (Prediction 2b). If that setting, we need to account for the extra utility of second movers thus equation (C1) needs to be modified as follows:

(C2) $\pi_1 - \pi_2 = e_1 + X(3y-1) - e_2 - f(e_2,r) - 3X(1-y) = e_1 - e_2 + 6yX - 4X - \eta\,(e_2 - r)$

Using the same logic as above, we can derive the behavior for first-movers to see that the amount sent decreases when the second-mover experiences the positive random-shock:

$$X = \frac{e_1 - e_2}{4} - \frac{1}{32\,\alpha_1} - \frac{\eta\,(e_2 - r)}{4}$$

Case 2. First-movers expect a positive return from second-movers

Consider that first-movers are inequality averse and expect from second-mover to return $y = E(y|x) = y^*(X)$. Under the assumption that second-movers are inequality averse and use their initial endowment as a reference point, the optimal return of the second-mover is given by:

$$y = \frac{2}{3} - \frac{1}{24\,X\,\alpha_2} + \frac{e_2 - e_1}{6X} + \frac{\eta\,(e_2 - r)}{6X}$$

If we use equation (C1) and replace the value of *y* into the utility function of the first-mover:

$$u_1 = e_1 + 3X\left(\frac{2}{3} - \frac{1}{24\,X\,\alpha_2} + \frac{e_2 - e_1}{6X} + \frac{\eta\,(e_2 - r)}{6X}\right) - X - \alpha_1\left(e_1 - e_2 + 6X\left(\frac{2}{3} - \frac{1}{24\,X\,\alpha_2} + \frac{e_2 - e_1}{6X} + \frac{\eta\,(e_2 - r)}{6X}\right) - 4X\right)^2$$

$$u_i = e_1 + 2X - \frac{1}{8\,\alpha_2} + \frac{e_2 - e_1}{2} + \frac{\eta\,(e_2 - r)}{2X}) - X - \alpha_1\left(e_1 - e_2 + \frac{12X}{3} - \frac{1}{4\,\alpha_2} + e_2 - e_1 + \eta\,(e_2 - r) - 4X\right)^2$$

$$u_1 = e_1 + X - \frac{1}{8\,\alpha_2} + \frac{e_2 - e_1}{2} + \frac{\eta\,(e_2 - r)}{2X} - \alpha_1\left(\frac{1}{4\,\alpha_2} + \eta\,(e_2 - r) - 4X\right)^2$$

$$u_1 = e_1 + X - \frac{1}{8\,\alpha_2} + \frac{e_2 - e_1}{2} + \frac{\eta\,(e_2 - r)}{2X} - \alpha_1\,(\frac{1}{4\,\alpha_2} + \eta\,(e_2 - r) - 4X)^2$$

Taking derivatives with respect to the amount to send we obtain the first-order condition:

$$1 - \frac{\eta\,(e_2-r)}{2X^2} - (2\,\alpha_1)(-4)\left(\frac{1}{4\,\alpha_2} + \eta\,(e_2 - r) - 4X\right) = 0$$

$$1 - \frac{\eta\,(e_2-r)}{2X^2} + 8\,\alpha_1\left(\frac{1}{4\,\alpha_2} + \eta\,(e_2 - r) - 4X\right) = 0$$

$$1 - \frac{\eta\,(e_2-r)}{2X^2} + 8\,\alpha_1\left(\frac{1}{4\,\alpha_2} + \eta\,(e_2 - r)\right) - 36\,\alpha_1 X = 0$$

$$2X^2 - \eta\,(e_2 - r) + 16\,X^2\,\alpha_1\left(\frac{1}{4\,\alpha_2} + \eta\,(e_2 - r)\right) - 72\,\alpha_1 X^3 = 0$$

$$2X^2\left(1 + 8\,\alpha_1\left(\frac{1}{4\,\alpha_2} + \eta\,(e_2 - r)\right) - 36\,\alpha_1 X\right) - \eta\,(e_2 - r) = 0$$

As we are concerned with the possibility that first- and second-movers are inequality averse let us assume that $e_2 = r$, i..e, there is no reference-depedent utility.

This, in turn, implies that the first-order contion can be written as follows:

$$2X^2\left(1 + 8\,\alpha_1\left(\frac{1}{4\,\alpha_2}\right) - 36\,\alpha_1 X\right) = 0$$

$$1 + 8\,\alpha_1\left(\frac{1}{4\,\alpha_2}\right) = 36\,\alpha_1 X$$

$$1 + \left(\frac{2\alpha_1}{\alpha_2}\right) = 36\,\alpha_1 X$$

The optimal amount to be sent by first-movers is therefore:

$$X = \frac{2\alpha_1 + \alpha_2}{36\,\alpha_1\alpha_2}$$

And this amount is decreasing in the degree of inequality aversion of second-movers, α_2. A similar argument applies when there is reference-dependent utility (but the algebra is more messy in that setting).

Appendix D

Our paper examines the effects of positive random shocks that affect the wealth of second-movers on levels of trust and trustworthiness. Bejarano et al. (2018) have previously investigated the effects of negative random shocks that affect the wealth of second-movers. In their analysis they have data for a *Baseline-Equal* treatment (in which first- and second-movers are both endowed with 21 E$) and a *Baseline-Unequal* treatment (in which first-movers receive 21 E$ and second-movers receive 7E$). Additionally, in their shock treatments first and second-movers are initially endowed with the same amount (21E$). In these treatments, the outcome of a die roll can affect the endowment of the second-mover by reducing their initial endowment in 14 E$. This reduction takes place if the outcome of the die is odd (*Shock-Unequal*). If the outcome of the die is even, then second-movers keep their initial endowment (*Shock-Equal*). In this Appendix we want to compare our current findings with the results in Bejarano et al. (2018) (and additional data we obtained for their baseline treatments). Recall that our current design is such that second-movers are initially given 7E$ in the *Bonus* treatments, and the outcome of the die roll determines whether second-movers keep their initial endowment (*Bonus-Unequal*) or we give them an extra endowment of 14 E$ (*Bonus-Equal*). Table D1 summarizes all the treatment conditions. This includes information on the number of pairs in each treatment.

Table D1. Summary of treatment conditions

		Initial endowments		
Treatment	**N**	**First-mover**	**Second-mover**	
Baseline-Equal	53	21 E$	21 E$	
Baseline-Unequal	52	21 E$	7 E$	
Bonus-Equal (Bonus)	45	21 E$	7 E$ ➔ 21 E$	The outcome of the die was odd and 14 E$ were increased from the initial endowment of the second-mover.
Bonus-Unequal (No bonus)	54	21 E$	7 E$ ➔ 7 E$	The outcome of the die was even and the second-mover kept her initial endowment.
Shock-Equal (No shock)	44	21 E$	21 E$ ➔ 21 E$	The outcome of the die was even and the second-mover kept her initial endowment.
Shock-Unequal (Shock)	47	21 E$	21 E$ ➔ 7 E$	The outcome of the die was odd and 14 E$ were reduced from the initial endowment of the second-mover.

Note. N refers to the number of pairs in each treatment.

Predictions of the model and behavior of second-movers

We rely on our theoretical framework to derive testable predictions regarding the effects of positive and negative random shocks on the behavior of first and second-movers. Our model assumes that second-movers evaluate any "gain-loss" utility using a reference point (r). We assume that second-movers use the function $f(e_2| r) = e_2 + f(e_2, r)$ where the value of $f(e_2, r)$ depends on whether the final endowment of the second-mover is above or below their reference point (r). In particular we assume that:

(D1) $f(e_2, r) = \begin{cases} \eta\,(e_2 - r) & \text{if } e_2 \geq r \\ \eta\,\lambda\,(e_2 - r) & \text{if } e_2 < r \end{cases}$

where $\eta \geq 0$ and $\lambda > 1$ to account for the fact that losses loom larger than equal-sized gains. Following the logic from the current paper, we assume that second-movers use their initial endowment as a reference point.[3] This, in turn, implies that second-movers receive a *bonus* (or a gain in utility) $f(e_2, r) = \eta\,(e_2 - r) \geq 0$ when there is a positive random shock in the Bonus-Equal treatment. In the case of a negative random shock in the Shock-Unequal treatment, there is a *loss* in utility $f(e_2, r) = \eta\,\lambda\,(e_2 - r) < 0$ because $e_2 < r$. When a bonus or a shock is possible but not realized (e.g., in the Shock-Equal or the Bonus-Unequal treatments) there is no gain or loss in utility and $f(e_2, r) = 0$ because $e_2 = r$.

We can compute the optimal return of second-movers under the assumption that they are inequality-averse and have reference-dependent utility. In this setting, second-movers will choose an optimal return y^* that maximizes:

$$u_2 = \pi_2 - \alpha_2\,(\pi_2 - \pi_1)^2 = e_2 + f(e_2, r) + 3X(1 - y) - \alpha_2\,(e_2 - e_1 + f(e_2, r) + 2X(2 - 3y))^2$$

In line with the results reported in the current paper, we can show that second-movers who are inequality-averse and have reference-dependent utility will choose the following return:

(D2) $y^* = \frac{2}{3} - \frac{1}{24\,X\,\alpha_2} + \frac{e_2 - e_1}{6X} + \frac{f(e_2, r)}{6X}$

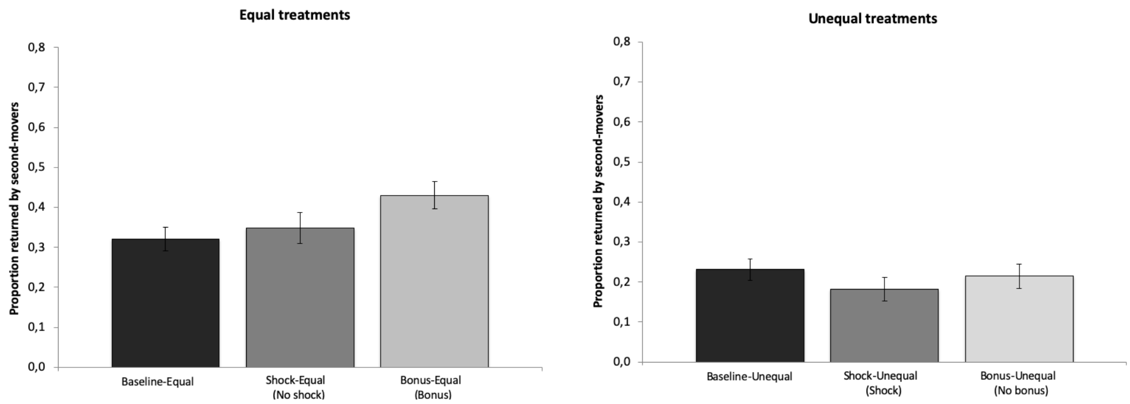
As noted, the endowment of the second-mover is constant in the Baseline-Equal and Baseline-Unequal treatments; i.e., $f(e_2, r) = 0$ because $e_2 = r$. As we explain in the current paper, the difference in the initial endowments $(e_2 - e_1)$ should be key in explaining the behavior of second-movers when positive and negative random shocks are not possible (see Prediction 1). In this regard, if the reference point does not matter for the behavior of second-movers (i.e., $f(e_2, r) = 0$) they should behave in the same manner in the Baseline-Unequal and the Shock-Unequal treatments. Similarly, we should find no differences in the behavior of second movers in the Baseline-Equal and Bonus-Equal treatments.

[3] At the end of this section we discuss how the predictions of the model change if we considered the expected endowment instead of the status-quo (or the initial endowment) as a reference point.

Arguably, second-movers can use their initial endowment as a reference point when positive and negative random shocks are possible. Bejarano et al. (2018) provide experimental evidence that second-movers return less after the occurrence of a negative random shock; i.e., the level of trustworthiness is lower in the Shock-Unequal than in the Baseline-Unequal treatment. This behavior can be predicted by equation (D3) after noting that $f(e_2, r) = \lambda \eta (e_2 - r) < 0$ in the Shock-Unequal treatment, while $f(e_2, r) = 0$ in the Baseline-Unequal treatment because $e_2 = r$. As for the possibility of positive random shocks, we show in the current paper that second-movers return more in the Bonus-Equal treatment, compared with the Baseline-Equal treatment. This behavior is also consistent with equation (D2) and the assumption that second-movers in the Bonus treatments cuse their initial endowment of $r = 7$ E$ as a reference point, thus they receive an extra utility of $\eta(e_2 - r) > 0$ after the occurrence of the negative random shock.

Figure D1 depicts the return ratio (i.e., the proportion that second-movers return) in each of the treatments in order to compare the behavior of second-movers when positive and negative random shocks are possible. The results of the non-paramteric tests are reported in Table D.2 (see Table 3 in the main text for the descriptive statistics).

Figure D1. Proportion returned by second-movers



Note. Error bars reflect standard errors of the mean.

Table D2. Non-parametric analysis for the share returned by second-movers

	Mann-Whitney test	Robust rank-order test
Baseline-Equal *vs* Baseline-Unequal	2.189*	2.249*
Shock-Equal *vs* Shock-Unequal	3.120*	3.348***
Bonus-Equal *vs* Bonus-Unequal	4.349***	5.116***
Baseline-Equal *vs* Shock-Equal	0.080	0.078
Baseline-Equal *vs* Bonus-Equal	1.985*	2.029**
Shock-Equal *vs* Bonus-Equal	2.654**	2.775**
Baseline-Unequal *vs* Shock-Unequal	2.483**	2.585***
Baseline-Unequal *vs* Bonus-Unequal	0.659	0.649

Notes: We report the Z-scores for both tests. Significance at *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$ level (for two-tailed analysis).

Consistent with the idea of inequality-aversion, we observe that second-movers return a lower proportion of the generated funds in the Unequal treatments in which there is inequality in favor of the first-mover, compared with the Equal treatments, in which the first- and the second-mover receive the same endowment. This is observed in all treatment conditions, no matter whether the inequality was initially given in the Baseline treatments ($p < 0.028$), was the result of a random shock that decreased the endowment of second-movers in the Shock treatments ($p < 0.002$) or took place because the endowment of the second-mover was not increased in the Bonus treatments ($p < 0.001$). Thus, our data suggest that second-movers are inequality-averse and return less when there is inequality in favor of the first-mover.

To test whether the occurrence of the negative random shock has indeed any effect on the behavior of second-movers (apart from the inequality it may generate) we compare the return ratio in the Baseline-Unequal and the Shock-Unequal treatment. The results of our non-parametric analysis indicate that second-movers do not behave differently in these two treatments at any common significance level (0.23 *vs* 0.18) ($p > 0.935$). However, we found that second-movers return more when a bonus increases their endowment in the Bonus-Equal treatment, compared to how much they return in the Baseline-Equal treatment (0.43 *vs* 0.32) ($p < 0.047$). Together, these findings indicate that the occurrence of a negative random shock make second-movers less willing to reciprocate, while the occurrence of the positive random shock increases their willingness to return. Interestingly, the reduction in the level of trustworthiness that resulted from the negative random shock is not significantly different from the reduction that resulted from the inequality this shock generates, while the increase in the level of trustworthiness that resulted from the positive random shock is significantly higher than the one that resulted from having the same endowment as the first-mover; in fact, we find that second-movers return significantly more in the Bonus-Equal than in the Shock-Equal treatment ($p < 0.008$).[4] This implies that second-movers may respond more positively to the occurrence of positive random shocks than they react negatively to the occurrence of negative random shocks. While this finding would be at odds with the idea of loss aversion and the assumption that $\lambda > 1$, it does support the possibility of reversed loss aversion in Harinck et al. (2007). In their paper, subjects are asked to rate how (un)pleasant would be finding (losing) small amounts of money. Harinck et al. (2007) find that negative feelings associated with small losses may be outweighed by positive feelings associated with equivalent small gains. In our setting, this could explain the observed behavior from second-movers if we assume that positive feelings associated to the occurrence of the positive random shocks can outweight the unpleasant feelings associated to the negative random shock.

One important take-home message from our findings concern the assumption that second-movers use their initial endowment as a reference point. In our setting, it is also possible to assume that second-movers use their expected endowment as a reference point. In that case, one would expect a positive response (i.e., a higher return) from second-movers in the Shock-Equal treatment where negative random shocks are possible but not realized. Similarly, second-movers would be expected to return less in the

[4] One interesting idea would be to estimate (e.g., using structural estimation) the values of λ or η in the model using the data for positive and negative random shocks. We consider this to be beyond the scope of the current paper.

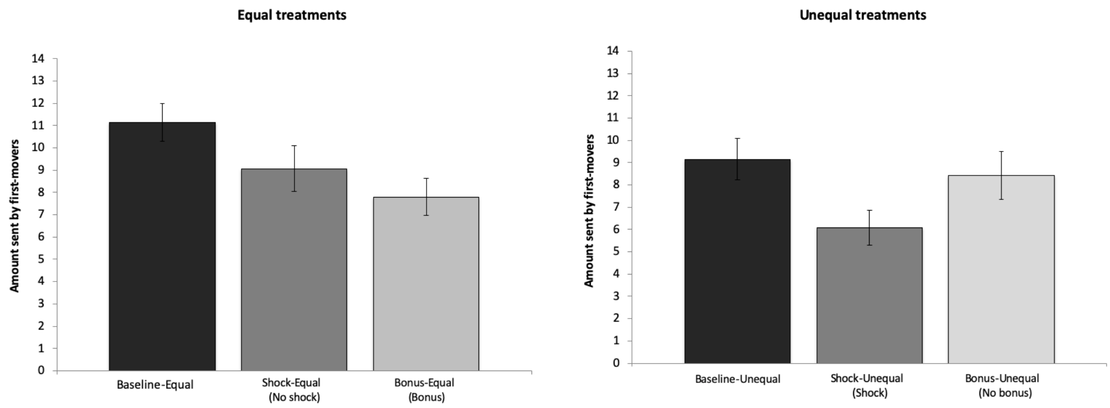
Bonus-Unequal treatment where positive random shocks are possible but not realized. Our results in Table D2 do not lend support for this assumption; i.e., the behavior of second-movers in the Shock-Equal treatment is not statistically different from their behavior in the Baseline-Equal treatment ($p > 0.935$), nor it is different the behavior of second-movers in the Bonus-Unequal and the Baseline-Unequal treatments ($p > 0.173$). We therefore conclude that the possibility that second-movers employ their initial endowment as a reference point is more consistent with our data.

Predictions and behavior of first-movers

Recall that *altruistic* first-movers are trying to reduce the existing inequality. Because they are assumed to expect nothing from second-movers, first-movers should send more if there is inequality in their favor in the Baseline-Equal treatment, compared with the Baseline-Unequal treatment. Similarly, they will send more in the Shock-Unequal than in the Shock-Equal treatment, and will send more in the Bonus-Unequal than in the Bonus-Equal treatment.

Importantly, first-movers who are altruistic can anticipate the loss (gain) in utility of second-movers if a shock (bonus) has occurred to the second-movers. As a result, we expect first-movers to send more when second-movers have experienced the negative shock, compared with the amount the send to second-movers who were initially endowed with a lower endowment. Similarly, we expect that first-movers will send less to second-movers who received a bonus than to second-movers who are initially given the same endowment than first-movers.

Figure D2. Amount sent by first mover



Note. Error bars reflect standard errors of the mean.

The left-hand-side panel of Figure D2 displays the average amount sent by first-movers in treatments where first and second-movers have the same endowments (Equal treatments). The right-hand-side panel of Figure 1 displays the average amount sent in treatments where first-movers have a higher endowment than second-movers (Unequal treatments). The results of the non-parametric are reported in Table D3.[5]

Table D3. Non-parametric analysis for the amount sent by first-movers

	Mann-Whitney test	Robust rank-order test
Baseline-Equal *vs* Baseline-Unequal	1.969**	1.973**
Shock-Equal *vs* Shock-Unequal	2.294**	2.379**
Bonus-Equal *vs* Bonus-Unequal	0.141	0.138
Baseline-Equal *vs* Shock-Equal	1.959**	1.928**
Baseline-Equal *vs* Bonus-Equal	3.129***	3.302***
Shock-Equal *vs* Bonus-Equal	0.890	0.878
Baseline-Unequal *vs* Shock-Unequal	2.483*	2.585**
Baseline-Unequal *vs* Bonus-Unequal	1.066	1.042

Notes: We report the Z-scores for both tests. Significance at *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$ level (for two-tailed analysis).

When we compare the behavior in the Baseline-Equal and the Baseline-Unequal treatments (11.11 *vs* 9.15), we find that first-movers send significantly more in the former treatment ($p < 0.049$). There is also evidence that first-movers send more in the Shock-Equal than in the Shock-Unqual treatment ($p < 0.022$). Thus we can reject the idea that first-movers are altruistic and are trying to reduce the existing inequality.

A second option that we believe to be of great importance in explaining the behavior of first-movers concerns the possibility that first-movers anticipate that second-movers are inequality averse, but first-movers behave in a self-interested manner to maximize their expected payoff (Smith, 2011). This, in turn, implies that first-movers will send more when they expect to receive more from second-movers; i.e., trust will be higher in the absence of wealth inequality. One interesting question along these lines concerns the effect of the negative and the positive random shocks on the behavior of first-movers. Self-interested first-movers can anticipate that inequality averse second-movers will be less likely to reciprocate after experiencing a negative random shock, thus they will send more in the Baseline-Unequal than the Shock-Unequal treatment. Similarly, they will send more in the Bonus-Equal than in the Baseline-Equal treatment because they will anticipate that second-movers would be more likely to reciprocate if their endowment is the same as the endowment of the first-mover, especially when this is the result of a positive random shock.

The results for the effects of a negative random shock in Bejarano et al. (2018) indicate that first-movers seem to anticipate that second-movers who experience a shock will return less; thus first-movers send more in the Baseline-Unequal than in the Shock-Unequal treatment (9.15 *vs* 6.08) ($p < 0.013$). As reported in the paper, we do not find evidence that first-movers anticipate that second-movers will be more willing

[5] The Krusall-Wallis indicates that there is a significant difference in the behavior of first-movers in the Equal treatments ($p = 0.007$). The same conclusion holds when looking at the behavior of first-movers in the Unequal treatments ($p = 0.041$).

to reciprocate when their endowment is increased in the Bonus-Equal treatment; in fact, first-movers send more in the Baseline-Equal than in the Bonus-Equal treatment (11.13 *vs* 7.80) (p = 0.002). These results are interesting as they seem to suggest that self-interested first-movers can hold motivated beliefs regarding the behavior of second-movers. When second-movers experience a negative random-shock, first-movers may be likely to believe that second-movers will be less reciprocal, thus they send less to second-movers who suffer a shock. Arguably, first-movers do not seem follow this reasoning when second-movers receive a bonus; i.e., first-movers do not seem to anticipate that second-movers will be more reciprocal after receiving a positive random shock.

While it is possible that first and second-movers have different reference points when choosing the amount to send and the proportion to return, we believe that the behavior of first-movers may be explained assuming that they hold motivated beliefs regarding the behavior of second-movers; i.e., first-movers can use the occurrence of the shock in a self-serving manner. If a negative shock occurs to second-movers, first-movers anticipate that second-movers will reciprocate less, *but* if a positive random shock occurs to second-movers, then first-movers believe that there is already a mechanism that eliminates the inequality thus they do not need to send more to second-movers who experienced the positive random shock. This type of behavior would be consistent with the idea in Gino et al. (2016) that people hold motivated beliefs regarding the behavior of others so as to act egoistically. It is important to elicit the expectations of first-movers regarding the return of second-movers in the different treatments, though.

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