Ca' Foscari University of Venice

Department of Economics

Working Paper

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ISSN: 1827-3580
No. 02/WP/2023

Working Papers
Department of Economics
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Keywords
Income redistribution, Inequality aversion, Fairness, Experiment

JEL Codes
D31, D63, D81, C91

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When merit breeds luck (or not): an experimental study on distributive justice*

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Abstract

We experimentally investigate subjects' preferences for redistribution depending on i) their personal stake in the outcome (either absent or not), ii) the effect of luck in strengthening or weakening the income inequality as derived from merit, and iii) whether individuals are informed about their relative wealth position in the society or not. We find that self-interest is the main driver of subjects' redistributive choices when they have direct monetary interests in the outcome. Leaving subjects under the veil of ignorance about their relative gross income position reduces selfish behavior, also controlling for beliefs and risk attitude. Inequality aversion and fairness mostly affect redistributive choices of impartial spectators when recipients of redistribution are not informed about their initial endowments, suggesting that the luck vs. merit effect is not the only driver of redistribution on behalf of others.

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*Acknowledgements: We thank Giovanna Devetag, Matteo Ploner, and the participants at the 4^{th} Meeting of the Behavioral and Experimental Economics Network in Bologna for useful suggestions and discussions. Research support from Andrea Albarea from Ca' Foscari University of Venice is gratefully acknowledged.

1 Introduction

Individuals' perceptions of fairness and preferences for redistribution are critical nowadays, in view of many countries experiencing a significant increase in income inequality over the last 30 years (Akbaş et al., 2019; Sarfati, 2015; Piketty, 2014). Indeed, income inequality and distributive justice have long been at the center of policy and academic debates and represent widely investigated research topics in philosophy as well as in the other social sciences (Hobbes, 2008; Paine, 2004; Aristotle, 2000; Rawls, 1971; Smith, 1759).

The purpose of this paper is threefold: we investigate subjects' preferences for redistribution depending on i) their personal stake in the outcome (either absent or not), ii) the role of luck in strengthening or weakening income inequality as derived from merit, and iii) whether individuals are informed about their relative wealth position within the society or not.

First, preferences for redistribution are studied by introducing the concept of the *impartial spectator*, an individual not personally involved in the distribution of wealth. The impartial spectator is a well-known and extensively used tool to define and evaluate theories of distributive justice and which can be traced to Hume [1751] but also to Smith [1759]. In *The Theory of Moral Sentiments*, Adam Smith claims that human beings are characterized by an innate interest in the fortunes and misfortunes of other people and by an inclination to empathize with others[1]. Previous studies have analyzed the behavior of third-party spectators who have the opportunity to redistribute resources between two (or more) agents (e.g., Cappelen et al., 2022, Cappelen et al., 2017 and Mollerstrom et al., 2015). However, individuals do not exist in a vacuum but rather, they possibly share the same experiences at different times. Our paper aims to contribute to this literature by investigating whether having had direct experience of the economy affects the dis-

[1]Recent research in neuroscience on mirror neurons supports this perspective, providing evidence that humans have an innate capability to understand the mental states of others at a neural level (Viganò, 2017; Kiesling, 2012).

tributive preferences of otherwise external observers [Dengler-Roscher et al., 2018].

Second, in most previous literature redistributive preferences have been studied by separating the effect of luck vs. merit in generating income inequality (Gee et al., 2017; Durante et al., 2014). Studies show that people tend to ask for less redistribution when inequality results from the latter rather than from the former (Alesina and Giuliano, 2011; Fong and Luttmer, 2011; Alesina and Angeletos, 2005; Alesina and La Ferrara, 2005). Wealth inequality is, however, often the result of both merit and luck: when their relative impact on economic success is uncertain, high-earning individuals are shown to adopt self-serving beliefs (Valero, 2022; Deffains et al., 2016), so as to justify a lower level of taxation (Fehr and Vollmann, 2020), while external observers incline towards egalitarianism (Cappelen et al., 2022). Cappelen et al. [2017] examines a situation in which the income-generating process is perfectly observed by an external decision-maker who has to select how to eventually redistribute earnings: in their experiment the level of inequality between two subjects is maximum (one gets the total amount of points and the other gets nothing) and across treatments the only difference relates to the portion of points determined by luck and/or real effort; they find that tolerance of inequality is strongly prompted by merit, even if it contributes only slightly to generate high-earners' incomes. Yet, in the real world, luck might actually strengthen inequality determined by merit ("when it rains, it pours" in the popular adage) or weaken it. Our aim, therefore, is to investigate individuals' willingness to redistribute when luck differently shapes "deserved" inequality, meaning that initial endowments are determined by subjects' ability.

Third, we analyze the role of the *veil of ignorance*, whereby individuals' redistributive decisions are taken without awareness of their own relative wealth in the society. Harsanyi [1953] argues that, in such a case, the opinions expressed would be free of constraints and distortions and that a rational decision-maker would opt for an *utilitarian* decision rule. Differently, according to Rawls [1971], individuals' preferences for justice are driven by the *difference principle* such that inequalities are justified only if their presence improves the conditions of the worst-off[2]. Besides affecting the behavior of agents directly involved in the redistribution process, Charité et al. [2022] suggest that the veil of ignorance favors redistribution by a social planner when initial allocations are entirely due to luck. The deservingness granted high earners in our experiment allows us to further pursue this line of research.

In a laboratory experiment, we investigate a society formed by three individuals randomly re-matched in each period. In each group, at the beginning of each period, a member is randomly assigned to the role of the external observer, whose earnings are fixed. The gross incomes of the other two group members depends i) on their outcome in an ability task and ii) on a random component, the latter being of high or low intensity. The random component affects the incomes earned from the ability task as in a zero-sum game, such that a positive shock for one subject corresponds to a negative shock for the other subject. The individuals' performance in the ability task and the realization of the random component jointly determine the level of inequality between the two group members not assigned the role of external observer. In the *Baseline (BSL) treatment* each individual is asked to vote for a redistributive scheme, being perfectly informed about their own relative wealth position in the society. This latter condition is not met in the *Veil Of Ignorance (VOI) treatment*, where group members who are not drawn as external observers are not informed of their relative position in the ability task.

We find that self-interest is the main driver of behavior when individuals have a direct interest in the re-distributive scheme and are perfectly informed about their relative position in the society. Leaving subjects under the veil of ignorance dampens selfish behavior, also controlling for beliefs and risk attitude. Subjects drawn as external observers behave differently between the VOI treatment and the BSL treatment. Mainly, in the VOI treatment we observe evidence of both inequality

[2]The Rawlsian veil is more opaque than the one proposed by Harsanyi [1953] so that in the former individuals know nothing even about the characteristics of individuals or the society.

aversion and fairness: individuals, when playing the role of external observers, ask for higher redistribution as inequality increases and when the random component leads to a re-ranking of the best and worst performers' wealth positions in the ability task. In the BSL treatment, we observe only slight evidence of inequality aversion but no evidence of fairness, even when a subject's personal experience as the individual with the highest gross income is positively related to their willingness to redistribute when luck reverses the role of merit.

2 Literature Review

In the standard *homo oeconomicus* approach (Meltzer and Richard, 1981; Downs, 1957; Hotelling, 1929), perfectly informed rational agents are driven by their willingness to maximize income when voting for redistribution. The median voter theorem applies to these models so that individuals who benefit (suffer) from the re-distributive policy support (oppose) it. Thus, in a world of high inequality, with a large majority of poor people, the standard model predicts that the demand for redistribution is high and increasing with the level of inequality.

However, empirical data do not always support these theoretical predictions (Guvenen et al., 2014; Alesina and Giuliano, 2011; Milanovic, 2000; Bertola and Ichino, 1995). For example, although inequality in income distribution in the US is higher than it is in Europe, redistributive policies are more extensive in the latter than in the former (see Alesina and Angeletos, 2005). To overcome these divergences, previous studies have focused on the role of efficiency (Durante et al., 2014; Krawczyk, 2010; Beckman et al., 2004), risk aversion (Zame et al., 2020) and social preferences (Durante et al., 2014; see Mengel and Weidenholzer, 2022 for a recent survey of the literature).

As shown in the experimental studies by Bjerk [2016], Schildberg-Hörisch [2010], and Beck [1994], when uncertainty surrounds future income and sufficiently persistent tax regimes, risk aversion can be a key determinant of the demand for redistribution, so that even the richest individuals are willing to insure themselves against negative income shocks. Charité et al. [2022] suggest that uncertainty about relative unearned income positions might affect external observers as well, if they consider whether the recipients of redistribution have the opportunity to form references points. Our study goes further by analysing external observers' redistributive choices when individuals are uncertain about their relative income position and merit defines initial income inequality which, in turn, might be exacerbated or reduced by luck, a situation more likely to occur in reality.

Social preferences, such as fairness, might also affect individuals' willingness to modify income distributions. Fairness has been studied in several theoretical and experimental contributions in the field of distributive justice (Roemer and Trannoy, 2015; Cappelen et al., 2007; Konow, 2003). Three main ideals of fairness are represented by egalitarianism, libertarianism, and liberal egalitarianism. Egalitarianism implies that inequality cannot be justified within a society such that everyone should get an equal share of wealth, regardless of the marginal contribution of individuals in its production. According to libertarianism, instead, a fair distribution should reflect precisely the contribution of each subject to the realization of wealth, eventuating in inequality characterizing the society. Liberal egalitarianism, finally, assumes an intermediate position where inequalities are acceptable only when they depend on factors within the control of the agents.

Previous evidence indeed suggests that the *source* of wealth plays a crucial role in affecting re-distributive preferences (Hoffman and Spitzer, 1985; Leventhal and Michaels, 1971). More specifically, there is an extensive literature of laboratory experiments that investigate the role of the source of income, being either effort or luck, in affecting preferences for redistribution (Lefgren et al., 2016; Durante et al., 2014; Balafoutas et al., 2013; Fong and Luttmer, 2011; Krawczyk, 2010; Fong, 2001). Notwithstanding some conflicting results (Ku and Salmon, 2013), most of these experiments show that inequality obtained after performing an ability or an effort task leads to lower support for redistribution than when inequality is determined by (uncontrollable) luck (Cappelen et al., 2017; Lefgren et al., 2016; Mollerstrom et al., 2015; Cappelen et al., 2013; Cherry et al., 2002; Konow, 2000; Ruffle, 1998; Hoffman et al., 1994). In their experiment, Gee et al. [2017] show that an increase in inequality lifts support for redistribution when income is allocated randomly, but not when it is earned through performance, suggesting that meritocracy is an important driver in this context (McCoy and Major, 2007). Nevertheless, Rawls [1971] criticizes an idea of distributive justice based solely on merit since even the distribution of ability depends on nature. Therefore, a distribution of wealth based on merit may still be morally arbitrary (see also Becchetti et al. [2011] and Sacconi [2011]).

Our aim is thus to provide evidence on individuals' willingness to redistribute resources when luck might actually strengthen or weaken inequality determined by merit, so that initial (dis)advantages might translate into larger or smaller ones. In a theoretical study, Alesina and Angeletos [2005] show how two otherwise identical societies can arrive at two very different levels of inequality and redistributive schemes, depending on individuals' perceptions of merit compared to luck in determining the distribution of gross income. Cappelen et al. [2022] shows that when the degree of uncertainty about the source of income inequality, being either luck or ability is varied, a strong egalitarian pull is the most common response of external observers. In our experiment, we remove any uncertainty surrounding the role of luck vs. merit in determining inequality. Does providing individuals with information on the causes of economic inequality which depends on *both* merit and luck heighten their concerns about inequality? Once merit defines a primary reason for income inequality, are external observers more prone to ask for redistribution when luck intervenes to increase, reduce or even reverse inequality among people?

3 The Experiment

Our experiment consists of two main between-subjects treatments: the Baseline (BSL) treatment and the Veil Of Ignorance (VOI) treatment. Each experimental session of both treatments is composed of 12 rounds involving 18 participants in each session. In both treatments, at the beginning of each experimental session, we randomly assign participants to groups of three individuals, with a random re-matching at the beginning of each of the 12 rounds.

Each group of three individuals comprises of three types of players: Player A, Player B, and Player C. The role of Player B is randomly assigned, in each group, at the beginning of each round. By contrast, the roles of Player A and Player C depend on the performance of the remaining two group members in an ability task, with the best (worst) performer getting the role of Player A (Player C)[3]. The ability task consists of five closed-ended questions[4]. Each question has one correct answer, three wrong answers, and one *"I do not know"* option. Players have two minutes to answer the five questions and, for each question, they get a $+1$ score if they choose the right answer, a -1 score if they select the wrong answer and, finally, a 0 score if they choose the *"I do not know"* option[5].

While Player B gets a fixed income equals to 75 points, gross incomes of Player A and Player C depends i) on their performance in the ability task, with player A getting 100 points and player C getting 50 points[6], and ii) on a random compo-

[3]The role of Player B is assigned and made known before the ability task. This is to avoid individuals choosing not to exert effort in the ability task if expecting that with a one-third probability their performance would be irrelevant. However, during the ability task, Player B has the opportunity to read the questions testing the other two players.

[4]The questions were selected from different fields (for example, mathematics, psychology, history, general culture, grammar) and require different degrees of skills, knowledge, and effort. The questions, as participants were informed, were taken from admission tests for entering Economics, Business or Psychology programs at university.

[5]If both group-members get the same score in the ability task, the subject who spent least (most) time in answering the questions is assigned the role of Player A (Player C). If the two group members have also spent the same amount of time answering the questions, the computer then randomly assigns types A and C. However, given the precision of the software in determining each subject's response time (i.e. time is counted in milliseconds), the use of this random draw was never necessary during the experiment.

[6]The conversion rate used in the experiment is such that 10 points = 0.1 Euros

nent, whose value is communicated to all participants once types A, B, and C are assigned.

The random component consists of an amount of points added to Player A and subtracted from Player C or vice-versa, meaning that the random component of income is of *opposite* sign for the two players. The magnitude of the random component might be of two different levels, with equal probability, in each round. In the case where a high-intensity random component applies, 40 points are added to Player C and subtracted from Player A or vice versa. In the case of a low-intensity random component applying, 20 points are added to Player C and subtracted from Player A or vice versa. To sum up, in each round, four possible distributions of gross income or *states of the world* can emerge with equal probability (25%). In the following, we will refer to them as $Ineq\_10$, $Ineq\_90$, $Ineq\_130$ and $Ineq\_30\_R$, so that each state of the world is identified by the distance in points between the richest and the poorest in the society (see Table 1).

Table 1: Parameters of the experiment.

States of the World	Player	Ability	Random Shock	Gross Income
Ineq_10	A	100	-20	80
	B	/	/	75
	C	50	+20	70
Ineq_90	A	100	+20	120
	B	/	/	75
	C	50	-20	30
Ineq_130	A	100	+40	140
	B	/	/	75
	C	50	-40	10
Ineq_30_R	A	100	-40	60
	B	/	/	75
	C	50	+40	90

Four states of the world are implemented with equal probability in each round $Ineq\_10$, $Ineq\_90$, $Ineq\_130$ and $Ineq\_30\_R$. Player B always has a fixed income of 75 points. The random component of the gross income is always opposite in sign for players A and C. *Inequality* is equal to the difference, in absolute value, between the gross income of Player A and Player C.

Note that in all states of the world except Ineq_30_R, when considering the effects of the random component on gross income, the relative wealth position of players is kept constant with respect to the outcome of the ability task. Differently, in the state of the world Ineq_30_R, the high-intensity random component causes a re-ranking of players so that Player C (Player A) becomes the richest (the poorest).

In the BSL treatment, after being informed about the realization of the random component (i.e. the state of the world), each group member is asked to choose which tax rate they would like to be applied to their group's gross income distribution. More specifically, each player has to select a tax rate from 0%, which preserves the status quo, meaning that the distributions of gross and net incomes are identical, up to 100%, which involves a completely egalitarian distribution of net incomes, equal to 75 points for each player. All intermediate rates, from 10% to 90%, measured in intervals of 10% points each, allow a reduction in the inequality between group members.

When making their choice, group members are shown, for each possible tax rate, the resulting distributions of net incomes that would be implemented, depending on their specific state of the world, as shown in Table 2. The tax rate implemented to define the effective distribution of the group's net incomes in each round is the one preferred by the majority, that is, the highest tax rate that at least two out of three individuals are willing to accept[7]. Importantly, the overall wealth in all states of the world is constant (that is, 225 units), so that efficiency concerns play no role in our context. Only the distribution of wealth varies as a consequence of the random component. Player B has a fixed amount of 75 points which corresponds to one-third of the pie, and the other two players must divide the remaining two-thirds.

Each member of the group is finally informed of both the tax rate implemented and the distribution of net incomes resulting from its implementation.

[7]More specifically, if the three group members vote for three different tax rates, for example 10%, 50% and 70%, the implemented tax rate will be equal to 50%.

Table 2: Distributions of net incomes obtained for each possible tax rate level in the different states of the world.

Ineq_10	Net Incomes		
Tax Rate	A	B	C
0%	80	75	70
10%	79,5	75	70,5
20%	79	75	71
30%	78,5	75	71,5
40%	78	75	72
50%	77,5	75	72,5
60%	77	75	73
70%	76,5	75	73,5
80%	76	75	74
90%	75,5	75	74,5
100%	75	75	75

Ineq_90	Net Incomes		
Tax Rate	A	B	C
0%	120	75	30
10%	115,5	75	34,5
20%	111	75	39
30%	106,5	75	43,5
40%	102	75	48
50%	97,5	75	52,5
60%	93	75	57
70%	88,5	75	61,5
80%	84	75	66
90%	79,5	75	70,5
100%	75	75	75

Ineq_130	Net Incomes		
Tax Rate	A	B	C
0%	140	75	10
10%	133,5	75	16,5
20%	127	75	23
30%	120,5	75	29,5
40%	114	75	36
50%	107,5	75	42,5
60%	101	75	49
70%	94,5	75	55,5
80%	88	75	62
90%	81,5	75	68,5
100%	75	75	75

Ineq_30_R	Net Incomes		
Tax Rate	A	B	C
0%	60	75	90
10%	61,5	75	88,5
20%	63	75	87
30%	64,5	75	85,5
40%	66	75	84
50%	67,5	75	82,5
60%	69	75	81
70%	70,5	75	79,5
80%	72	75	78
90%	73,5	75	76,5
100%	75	75	75

In the VOI treatment, the only difference with respect to the BSL treatment is that those two group members who are not assigned the role of Player B are not informed about their outcome in the ability task, meaning that they are not aware of whether they are type A or type C players. However, we elicit their beliefs about whether they were assigned the role of player A or of Player C. In particular, they are asked to select one option out of five, going from *"I believe I am player A"* to *"I believe I am player C"*[8]. At the end of each round, besides being informed about the implemented distribution of net income, group members in the VOI treatment are also provided with feedback about their type (either type A or type C).

Five experimental sessions of both the BSL treatment and the VOI treatment were run.

[8]Beliefs are not incentivized. This is to avoid group members not assigned to the role of Player B purposely distorting their performance in the ability task so as to be assigned the role of Player C, getting a sure payoff in the belief elicitation phase (see also Blanco et al. [2010]).

Each experimental session lasted about one and a half hours. The experiment was programmed with the *zTree* software (Fischbacher, 2007) and carried out in October 2019 at the CERME (Center for Experimental Research in Management and Economics) Laboratory at the Ca' Foscari University of Venice[9]. A total of 180 individuals, recruited via the ORSEE software (Greiner, 2015), participated in the 10 experimental sessions: 76 were males (42%) and 104 females (58%) and the mean age 21.5 years. More than half of the participants (67.22%) were students in Economics or Management at Ca' Foscari University of Venice. At the end of the experiment, one round out of twelve was randomly drawn and each participant privately paid in cash. The average payment was 11.5 euro, including a participation fee of 4 euro.

4 Hypotheses

4.1 Hypotheses on Player B

Player B's (net) income is always equal to 75 points, no matter the tax rate implemented. According to standard economic theory, we should expect no differences in the tax rate voted by Player B in the various states of the world, either in the VOI treatment or in the BSL treatment. We can therefore formulate the following hypotheses.

Hypothesis 1. *When assigned the role of external observers, subjects are indifferent to the level of wealth inequality in the different states of the world.*

Nevertheless, conversely to hypothesis 1, humans have been shown to also have egalitarian preferences (see Dawes et al., 2007). In our experiment, external observers pay no personal cost to reduce inequality. Thus, if individuals care about inequality, and only about inequality, independently of the notion of non-self-centered inequality aversion (Clark and d'Ambrosio, 2015; Alesina and Giuliano, 2011) or self-centered inequality aversion (Fehr and Schmidt, 1999) applying, we should expect that external observers should

[9]The experiment was conducted in Italian. The English version of the instructions is available in Appendix B.

always ask for a tax rate equal to 100%[10].

Furthermore, a normative approach suggests that the valuation of inequality also depends on whether the resulting distribution is ethically justifiable. A liberal egalitarian perspective thus provides a fairness argument for defining redistributive choices. More specifically, in order for the net income to be close to the gross income, as defined by the ability task, the level of the tax rate voted by Player B should correspond to 0% in the Ineq_10 state, to 40%, in the Ineq_90 state, to 60% in the Ineq_130 state, and to 100% in the Ineq_30_R state. In particular, fairness plays a prominent role in the analysis of subjects' behavior in the state of the world Ineq_30_R where, despite the inequality level being relatively low and equals to 30, the random component affects the gross income such that the relative wealth positions of Player A (the one who performed best in the ability task) and player C (the one who performed worst during the ability task) are reversed.

Hypothesis 2. *The voting behavior of external observers, namely their redistributive choices, does not change comparatively between the BSL treatment and the VOI treatment.*

Hypothesis 2 relates to the effect of the veil of ignorance on the redistributive choices of external observers. While standard predictions suggest that external observers' preferences should not be affected by the uncertain identification of Players A and C, Charité et al. [2022] find evidence that subjects who are given the opportunity to redistribute unequal, unearned initial endowments between two anonymous recipients are less likely to redistribute when the recipients know their initial endowments than when they do not know them. Based on this, external observers, when thinking about redistribution, might consider whether individuals have the opportunity to form references points, as could be the case in the BSL treatment but not in the VOI treatment. Then, if individuals are loss-averse relative to these reference points, in that the reduction in utility from a (relative) loss is greater than the increase in utility from a corresponding gain, we should observe a higher rate of redistribution in the VOI treatment than in the BSL treatment.

[10] Note that efficiency plays no role in our setting, since the overall wealth remains constant across all states of the world and tax levels.

4.2 Hypotheses on Players A and C

According to standard economic theory, in the BSL treatment, we should expect players to vote according to their self-interest; the richest player (Player A in the states of the world Ineq_10, Ineq_90 and Ineq_130 and Player C in the state of the world Ineq_30_R) should choose a tax rate equals to 0% while the poorest player (Player A in the state of the world Ineq_30_R and Player C in the states of the world Ineq_10, Ineq_90 and Ineq_130) should choose a tax rate equals to 100%.

Hypothesis 3. *In the BSL treatment, players, when assigned the role of player A or player C, elect the tax rate that maximizes their monetary net income.*

In the VOI treatment, the theoretical prediction of the standard economic theory would be that each player, when not drawn as the external observer (i.e. Player B), votes according to their beliefs. The strongest one's belief of being Player A (Player C), the lowest (highest) the tax rate voted in the states of the world Ineq_10, Ineq_90 and Ineq_130. Individual risk aversion has an effect, making players more cautious in their choices when they are uncertain about their type.

Hypothesis 4. *In the VOI treatment, players' beliefs about being of type A or of type C determine the tax rate voted, which can differ with respect to the Baseline treatment depending on the strength of their confidence about their relative performance in the ability task.*

5 Results

We begin our analysis by considering the voting behavior of players when drawn as external observers, in both the BSL and in VOI treatments. We will then focus on players A and C[11].

[11] In Appendix A we provide additional figures on the dynamics of the mean tax rate voted by players A, B and C in the different treatments and states of the world.

5.1 Inequality aversion and fairness of the external observers

Table 3 reports the average tax rate voted by subjects when drawn as player B in the four states of the world, both in the BSL and VOI treatments. In the last column of Table 3 we report the results of a series of two-sample Wilcoxon rank-sum (MW, in the following) tests comparing the distribution of voting choices in the two treatments.

Table 3: Average tax rates voted by subjects drawn as Player B.

State	Mean tax rate voted - BSL Treatment	Mean tax rate voted - VOI treatment	MW test
Ineq_10	55.12%	47.83%	0.352
Ineq_90	64.37%	59.88%	0.587
Ineq_130	68.70%	75%	0.276
Ineq_30_R	60.79%	72.33%	0.033**

First, a set of one sample median tests confirms that in both the BSL and in the VOI treatments, and in all states of the world, the tax rate voted is significantly different than 50%, providing evidence that players assigned the role of external observers do not randomly choose the redistributive scheme to be applied. Table 3 shows that external observers are not indifferent to the level of inequality, as instead predicted by hypothesis 1.

Second, whereas for the states of the world Ineq_10, Ineq_90, and Ineq_130, we do not detect any statistically significant difference between the tax rates voted by the external observers in the BSL treatment and in the VOI treatment (where Players A and C are not told about their relative ranking position), we find that external observers are significantly less likely to reduce inequality in the BSL treatment than in the VOI treatment for the state of the world Ineq_30_R, when the random component reverses the income positions determined by the ability task.

Our results suggest the possible importance of (un)deservingness in the "reference-dependence" mechanism hypothesized by Charité et al. [2022]: indeed, while their focus is on the redistributive choices of external observers when considering unequal unearned initial endowments between two anonymous recipients, in our experiment, where ability instead defines initial income inequality, we observe a significant difference in the redistributive choices of the external observer between the BSL and the VOI treatments only in the Ineq_30_R state of the world, where luck reverses the relative income ranking determined by merit.

Finally, according to the libertarian egalitarian approach, the tax rate voted by external observers should be such that it makes the net income closer to the gross income, as defined by the outcome of the ability task, so as to be equal to to 0% in the Ineq_10 state, to 40%, in the Ineq_90 state, to 60% in the Ineq_130 state, and to 100% in the Ineq_30_R state. While a set of one sample median tests indicates that this is not what we observe in our data, the average tax rate voted by the external observer is strictly *increasing* in the inequality level when considering the states of the world where the random component does not imply a re-ranking of wealth. We further analyze this in Table 4, which provides the results of a set of MW tests comparing the average tax rate voted in the four possible states of the world, in each treatment.

Table 4: Mann-Whitney rank-sum test among the average tax rate voted by subjects drawn as Player B.

BSL Treatment	Ineq_10	Ineq_90	Ineq_130	Ineq_30_R
Ineq_10	/	1.042	-2.503**	-1.180
Ineq_90		/	-1.117	0.273
Ineq_130			/	1.515
Ineq_30_R				/

VOI Treatment	Ineq_10	Ineq_90	Ineq_130	Ineq_30_R
Ineq_10	/	1.913*	-4.602***	-3.445***
Ineq_90		/	-3.212**	-2.439*
Ineq_130			/	-.451
Ineq_30_R				/

Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

We find that in the BSL treatment, where subjects are informed of their ex-ante gross income before making their tax decisions, the tax rate voted by the external observer is significantly different only when comparing the states of the world characterized by the highest vs. the lowest level of inequality, namely Ineq_130 and Ineq_10. Otherwise, in the VOI treatment, the tax rates voted in each state of the world differ significantly from each other, except between Ineq_130 and Ineq_30_R, where we compare the highest level of inequality to the lowest level of fairness. It is thus interesting to note that, in the VOI treatment, the average tax rate voted by Player B in the state of the world Ineq_30_R (where there is a re-ranking of relative income positions), is significantly higher than the tax rate elected in the state of the world Ineq_90, even if the former is characterized by an inequality level three times lower than the latter. This evidence suggests that fairness, understood as the relative role of luck with respect to ability in determining the richest player, which is the highest in the state of the world Ineq_30_R, might be determinant in affecting the redistributive choices of external observers when recipients are blind with respect to their relative income position[12].

In Table 5, to control for other factors possibly influencing the tax rate chosen by player B and to more formally test hypotheses 1 and 2, we report the results of a series of multi-level regression models, with standard errors clustered at both the session and individual levels. The first three columns of Table 5 refer to the BSL treatment, while the last three columns apply to the VOI treatment.

The dependent variable is the tax rate voted by Player B, which can take values in between 0 and 100, in ten percentage points. We use as independent variables $Ineq\_90$, $Ineq\_130$ and $Ineq\_30\_R$, three dummy variables for the three corresponding states of the world (with $Ineq\_10$ being the omitted state of the world). To check whether previous experience in the game, either as the richest or the poorest group member, affects an individual's willingness to ask for redistribution when acting as an external observer in the society, we include in the regression *ProportionA*, referring to the number of times the individual has been assigned the role of Player A in the ability task with respect to the total number of rounds played, discounting when she was assigned the role of Player B. The interactions of the dummies for states of the world with *ProportionA* are used to investigate whether more experience in the game as the richest group member differently affects the voted tax rate depending on the current state of the world.

[12]To provide further evidence on this, in Table A.1 in Appendix A we report the results of a series of multi-level regression models, with standard errors clustered both at the session and at the individual level, where we use as dependent variable the tax rate voted by external observers and as independent variables the treatments, the states of the world, and the interaction between these two variables.

Table 5: Multi-level regression: tax rate voted by type B subjects

	BSL treatment			VOI treatment		
Dep. var.: Tax_Rate_Voted	(1)	(2)	(3)	(4)	(5)	(6)
Ineq_30_R	0.066	-0.105	-0.093	0.225***	0.202**	0.221**
	(0.047)	(0.080)	(0.081)	(0.052)	(0.092)	(0.091)
Ineq_90	0.099*	0.082	0.075	0.129***	0.117	0.111
	(0.060)	(0.090)	(0.091)	(0.048)	(0.075)	(0.074)
Ineq_130	0.135***	0.116	0.117	0.254***	0.274***	0.268***
	(0.049)	(0.073)	(0.073)	(0.043)	(0.067)	(0.067)
prop_PlayerA	-0.073	-0.137	-0.145	0.023	0.031	0.033
	(0.065)	(0.109)	(0.108)	(0.056)	(0.129)	(0.129)
Ineq_30_R*prop_PlayerA		0.385***	0.368**		0.038	-0.014
		(0.146)	(0.147)		(0.168)	(0.169)
Ineq_90*prop_PlayerA		0.028	0.033		0.025	0.030
		(0.154)	(0.155)		(0.149)	(0.149)
Ineq_130*prop_PlayerA		0.004	0.011		-0.048	-0.063
		(0.133)	(0.133)		(0.139)	(0.139)
Period	-0.003	-0.006	-0.005	0.007	0.007	0.004
	(0.006)	(0.006)	(0.006)	(0.004)	(0.004)	(0.005)
Female			0.046			0.019
			(0.057)			(0.053)
Risk			0.003			-0.031**
			(0.012)			(0.014)
Constant	0.604***	0.657***	0.444**	0.439***	0.435***	0.684***
	(0.065)	(0.077)	(0.178)	(0.055)	(0.067)	(0.201)
Controls	NO	NO	YES	NO	NO	YES
Log likelihood	-120.522	-115.707	-111.445	-80.380	-80.045	-70.137
Wald chi2	12.670	22.910	32.320	42.960	43.670	67.310
Prob >chi2	0.027	0.004	0.029	0.000	0.000	0.000
Observations	360	360	360	360	360	360
Number of groups	5	5	5	5	5	5

Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors are clustered both at the individual and session level.

Columns (3) and (6) of Table 5 add a series of control variables extracted from the post-experimental questionnaire[13]. The dummy variable *Female* stands for the subject's gender while *period* takes into account the effect of experience in the experiment. A subject's attitude to risk is measured by *Risk*, which can take values from 1 (extreme risk averse) to 10 (extreme risk tolerance).

[13]We add the following control variables. *Economics* is a dummy variable representing the subject's field of study, while *job* identifies whether the subject is regularly working or not. The variables *Incomefamily* measures whether the subject perceives her family's income as very low or very high on a scale from 1 to 10, while *familyTax* represents the tax rate imposed on the income of the subject's family from less than 10% to more than 60%, with 10 intervals in-between. *Trust* is a categorical variable indicating subjects' attitudes about trusting others which can take values between 1 (not at all), to 10 (surely). We also measure participants' beliefs on whether helping other people represents a moral obligation, by means of the variable *helpothers*, which can take values from 1 (helping others does not represent a moral duty) to 10 (helping others does represent a moral duty). We asked individuals whether they think rich people deserve their prosperity and whether poor people do not exert themselves enough to improve their situation, measuring their answer on a scale from 1 to 10 throughout the variables *Deserve* and *Effort*, respectively. Finally, *inequality reduction* indicates whether the subject totally disagrees (equals to 0) or totally agrees (equals to 10) with the proposition that income inequality should be reduced in their country.

From the first column of Table 5 we can see that, in the BSL treatment, subjects, when not involved in the redistribution scheme, are only marginally sensitive to inequality. More specifically, as shown by the significant coefficient of *Ineq*_130, they ask for more redistribution as the difference between the gross incomes of the richest and the poorest subject reaches the maximum level, namely 130 points, than when it is at its lowest value, in the state of the world Ineq_10 (the omitted state of the world).

The data do not provide strong support in favor of fairness motives influencing the voting behavior of the external observers in the BSL treatment: when the random component causes a re-ranking of wealth positions of group members in the state of the world Ineq_30_R, making the distance between the richest player (Player C) and the poorest one (Player A) to be equal to 30 points, no significant difference in the tax rate voted by Player B is observed with respect to Ineq_10, a state of the world characterized by a difference of 10 points between the society's richest and poorest. Additionally, as shown in column (2), having more experience as Player A (i.e. the group member with the highest performance in the ability task) is associated with the individual, when acting as player B, increasing the level of redistribution in the state of the world Ineq_30_R, as shown by the significant and positive coefficient of *Ineq_30_R*ProportionA*, with this result being robust to the controls included in column (3). This evidence indicates that, when acting as external observers in the BSL treatment, individuals partially project their past "status" onto their decisions: those who were more likely to be identified as the best performers are indeed more likely to vote for redistribution in the state Ineq_30_R, where the best performers are mostly penalized by the random component of income.

Looking at the VOI treatment, in column (4) of Table 5 we observe that the tax rate voted by Player B when the level of inequality between the poorest and the richest players is equal to 10 is significantly lower than in all other states, such that inequality is an important driver of the decisions taken by Player B. In the VOI treatment, external observers are also more concerned about fairness than is evident in the BSL treatment. According to a Wald test performed on the state of the world estimates after the regression, the mean tax rate voted in Ineq_30_R is significantly higher than that voted in Ineq_90 ($\chi^2(1) = 3.03, p = 0.082$), despite the inequality level in the latter being three times lower than in the former (see also Table A.1 in the Appendix). Unlike in the BSL treatment, Player B's prior "status", identified by the variable *ProportionA* does not affect her choices as an external observer in the VOI treatment.

Overall, our results indicate that individuals, even when their monetary interests are not at stake, are concerned by the level of inequality. Such an effect, however, has two main conditions. First, as previous studies have shown (see Becchetti et al., 2011), the veil of ignorance makes inequality concerns more relevant. We provide evidence that such an effect also applies to external observers, who are not directly affected by the redistribution of income. This might be due, as suggested by Charité et al. [2022], to individuals who are loss-averse relative to the status quo represented by their gross income, such that a reduction in utility from a (relative) loss is greater than the increase in utility from a corresponding gain. If external observers are concerned about reference-dependence of others, they may demand a lower level of redistribution from rich to poor when others are aware of their relative ranking position and the state of the world (i.e. in the BSL treatment) than when they are uninformed (i.e. in the VOI treatment).

Second, in the BSL treatment, we also observe that previous relative wealth status of external observers plays a role in their voting decisions: those who were more likely to be the wealthiest in the society because of their ability, are also more likely to vote in favor of the richest when the role of luck becomes crucial in re-ranking the relative distribution of gross incomes determined by individuals' performance, suggesting that past relative income position could be an important factor in their redistributive choices.

5.2 Players A and C vote according to their self-interest in the baseline (BSL treatment)

Table 6 shows the average tax rate voted by Player A and Player C in the Baseline treatment.

We observe that the choices of Player A and Player C are significantly different in each state of the world, with *self-interest* playing a major role. Player A (C) chooses a tax rate between 13% and 17% (80% and 85%) when holding the highest (lowest) gross income in the society, namely in the states of the world Ineq_10, Ineq_90 and Ineq_130. Moreover,

Table 6: Average tax rates voted by Players A and C in BSL.

Mean tax rate voted (Baseline)		
State of the world	Player A	Player C
Ineq_10	13.33%	80.60%
Ineq_90	12.71%	84.79%
Ineq_130	16.93%	85.18%
Ineq_30_R	90.70%	12.19%

as shown in Table 7, the voted tax rates do not differ significantly depending on the level of inequality in the case of both types of player. Self-interest also drives the choices in the state of the world Ineq_30_R, where the random component of income reverses players' income positions.

Table 7: Mann-Whitney rank-sum test for the average tax rate in BSL

Player A	Ineq_10	Ineq_90	Ineq_130	Ineq_30_R
Ineq_10	/	0.926	-1.247	-11.631***
Ineq_90		/	-0.342	-10.475***
Ineq_130			/	-12.546***
Ineq_30_R				/
Player C	**Ineq_10**	**Ineq_90**	**Ineq_130**	**Ineq_30_R**
Ineq_10	/	0.401	-1.144	10.488***
Ineq_90		/	-0.545	9.796***
Ineq_130			/	12.073***
Ineq_30_R				/

Legend: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 8 reports the results of a series of multilevel regression models with standard errors clustered at both the individual and at the session level. In the first three columns of Table 8 we include the tax rate voted by subjects acting in the role of Player A, while the last three columns consider subjects who performed worst in the ability task (i.e. Player C). Looking at columns (1) and (4), we observe that only in the state of the world Ineq_30_R the voted tax rate is significantly different than it is in the state of the world Ineq_10, characterized by a difference of 10 points between the richest and the poorest players. More specifically, the coefficient of *Ineq_30_R* is significant but opposite in sign for the two types of player, positive (negative) for Player A (Player C), who is the poorest (richest) member because of the effect of the random component on gross income. This evidence provides support for hypothesis 3: Players A and C, in the Baseline treatment, are mainly driven by self-interest motives when voting for redistribution.

Table 8: Multi-level regression: tax rate voted by Players A and C in BSL.

	Player A			Player C		
Dep. var.: Tax_Rate_Voted	(1)	(2)	(3)	(4)	(5)	(6)
Ineq_30_R	0.772***	0.837***	0.853***	-0.710***	-0.728***	-0.730***
	(0.032)	(0.092)	(0.092)	(0.037)	(0.066)	(0.066)
Ineq_90	-0.032	0.060	0.082	0.052	-0.002	-0.008
	(0.040)	(0.119)	(0.120)	(0.047)	(0.071)	(0.070)
Ineq_130	0.023	0.102	0.125	0.048	-0.025	-0.040
	(0.033)	(0.096)	(0.097)	(0.039)	(0.060)	(0.060)
prop_PlayerA	0.014	0.103	0.127	0.050	-0.070	-0.086
	(0.060)	(0.108)	(0.109)	(0.071)	(0.122)	(0.121)
Ineq_30_R*prop_PlayerA		-0.099	-0.125		0.058	0.048
		(0.133)	(0.134)		(0.156)	(0.157)
Ineq_90*prop_PlayerA		-0.132	-0.159		0.173	0.182
		(0.157)	(0.157)		(0.190)	(0.190)
Ineq_130*prop_PlayerA		-0.115	-0.147		0.232	0.269*
		(0.131)	(0.132)		(0.146)	(0.147)
Period	-0.008*	-0.007*	-0.007	0.005	0.005	0.003
	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
Female			0.021			-0.009
			(0.033)			(0.040)
Risk			0.003			-0.014
			(0.007)			(0.009)
Constant	0.184***	0.124	0.170	0.765***	0.807***	0.684***
	(0.064)	(0.089)	(0.134)	(0.050)	(0.059)	(0.132)
Controls	NO	NO	YES	NO	NO	YES
Log likelihood	30.421	30.927	33.854	-26.333	-24.851	-17.138
Wald chi2	897.270	901.110	919.990	613.410	622.260	650.570
Prob >chi2	0.000	0.000	0.000	0.000	0.000	0.000
Observations	360	360	360	360	360	360
Number of groups	5	5	5	5	5	5

Legend: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at both the individual and session levels.

5.2.1 The role of uncertainty (VOI treatment)

We now turn our attention to hypothesis 4, which focuses on the behavior of Players A and C in the VOI treatment.

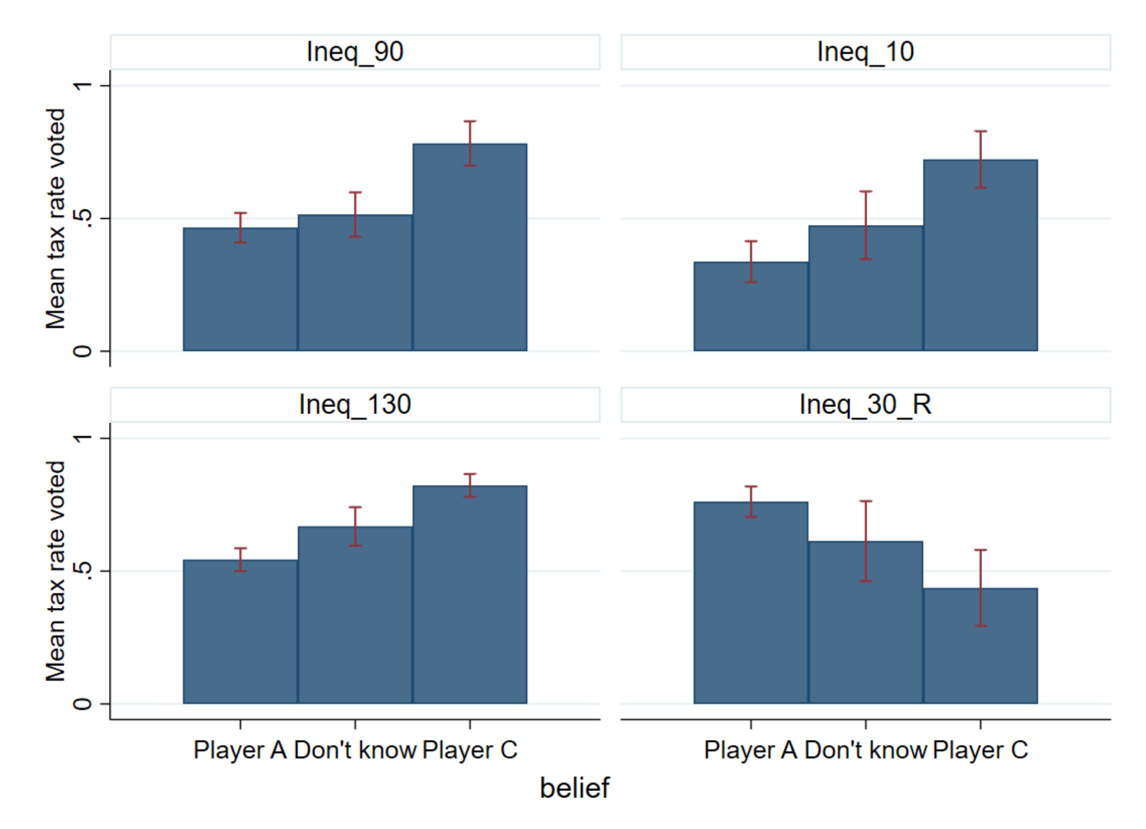
In the VOI treatment, players do not receive any feedback after performing the ability task, so they do not know whether they performed best (Player A) or worst (Player C). We do, however, elicit their beliefs about their type. More specifically, participants were asked to report their beliefs about being Player A or Player C on a 5-point rating scale scale from 1 (*"I believe I am player A"*) to 5 (*"I believe I am player C"*), immediately after completing the ability task.

Figure 1 reports the average tax rate indicated by those individuals who believe they are Player A (they chose point 1 or 2 on the 5-point rating scale, N=669/1080), or Player C (they chose point 4 or 5 on the 5-point rating scale, N=232/1080), or who do not provide a clear direction of their beliefs (they chose 3 on the 5 point rating scale, N=179/1080)[14].

To test hypothesis 4, namely whether the tax rates voted by subjects who believe themselves to be a certain type in the VOI treatment differ significantly from the tax rates voted by subjects of that type in the BSL treatment, we run a set of two-sample Kolmogorov–Smirnov tests of the equality of distributions of the voted tax rates in each state of the world. For players A we observe that under the veil of ignorance, individuals are more sensitive to inequality than they are in the BSL treatment (Ineq_10: (VOI) 33.75% vs. (BSL) 13.33%, $p = 0.002$; Ineq_90: 46.54% vs. 12.71%, $p = 0.000$; Ineq_130: 54.32% vs. 19.93%, $p = 0.000$ and Ineq_30_R: 76.14% vs. 90.71%, $p = 0.000$). Interestingly, the mean tax rates voted by players who believe they are type A in the states of the worlds Ineq_90 and Ineq_130 are those that would make the net distribution of incomes closer to the level of inequality as determined by the ability task, so that the role of luck would be offset as a consequence.

[14]While not a central focus of our paper, our setting allows observing possible differences in the beliefs of men and women. Numerous laboratory studies find that women are more often classified as inequality averse (Fehr et al., 2006), even if the results are sensitive to context, as suggested by Croson and Gneezy [2009]. Additionally, males and females have been shown to hold different beliefs about their ability, with men being more overconfident than women (Bengtsson et al., 2005; Barber and Odean, 2001). While in our main regression analyses we include gender as one of the independent variables, in Table A.3 in Appendix A we observe that indeed respondents' beliefs about performance differ depending on their gender.

Figure 1: Mean tax rates voted by subjects depending on their beliefs about being Player A or Player C.



The evidence is similar, but less compelling, for the tax rates voted by players who believe they are type C. In fact, the tax rates voted by Players C in the VOI treatment are significantly different to those in the BSL treatment in the states of world Ineq_30_R (43.67% vs. 12.19%, $p = 0.000$) and Ineq_130 (82.25% vs. 85.18%, $p = 0.003$): namely, when, fairness and inequality are minimized and maximized, respectively, but not in the states of the world Ineq_10 (72.22% vs. 80.60%, $p = 0.323$) and Ineq_90 (78.26% vs. 84.79%, $p = 0.260$). In Table 9 we investigate whether the tax rate voted in the VOI treatment is different depending on the level of inequality and fairness characterizing each possible state of the world, taking into account individuals' beliefs, experience as Player A and risk preferences. We also include a control for *strong_belief*, which is a dummy variable that considers the strength of the individuals' beliefs, equal to 1 (0) if the subject strongly (weakly) believes they are a certain type. The first three columns of Table 9 refer to the tax rates voted by subjects who believe they are Player A, while the last three columns apply to subjects who believe they are Player C. A first interesting result is the highly significant effect of the

Table 9: Multi-level regression: tax rate voted by subjects believing to be Players A and C in VOI.

Dep. var.: Tax_Rate_Voted	Belief of being Player A (1)	(2)	(3)	Belief of being Player C (4)	(5)	(6)
Ineq_30_R	0.424***	0.312***	0.314***	-0.274***	-0.552***	-0.557***
	(0.043)	(0.085)	(0.084)	(0.063)	(0.098)	(0.098)
Ineq_90	0.130***	0.119	0.115	0.035	0.031	0.028
	(0.042)	(0.075)	(0.075)	(0.056)	(0.096)	(0.096)
Ineq_130	0.197***	0.228***	0.221***	0.091**	0.072	0.070
	(0.038)	(0.070)	(0.069)	(0.046)	(0.080)	(0.080)
prop_PlayerA	-0.068	-0.086	-0.076	0.054	-0.046	-0.074
	(0.049)	(0.115)	(0.113)	(0.061)	(0.122)	(0.122)
Ineq_30_R*prop_PlayerA		0.204	0.183		0.765***	0.764***
		(0.145)	(0.145)		(0.194)	(0.194)
Ineq_90*prop_PlayerA		0.024	0.026		0.004	0.016
		(0.135)	(0.134)		(0.173)	(0.172)
Ineq_130*prop_PlayerA		-0.059	-0.062		0.033	0.045
		(0.126)	(0.125)		(0.138)	(0.137)
Strong_belief	0.171***	0.168***	0.171***	0.041	0.042	0.046
	(0.028)	(0.028)	(0.027)	(0.039)	(0.038)	(0.037)
Period	-0.002	-0.002	-0.005	0.005	0.005	0.007
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.006)
Female			0.036			-0.054
			(0.040)			(0.057)
Risk			-0.014			0.008
			(0.010)			(0.013)
Constant	0.280***	0.287***	0.652***	0.662***	0.711***	0.869***
	(0.062)	(0.078)	(0.158)	(0.062)	(0.077)	(0.192)
Controls	NO	NO	YES	NO	NO	YES
Log likelihood	-214.837	-212.068	-197.110	-29.164	-19.145	-14.967
Wald chi2	141.820	148.560	186.690	51.520	77.390	88.350
Prob >chi2	0.000	0.000	0.000	0.000	0.000	0.000
Observations	360	360	360	360	360	360
Number of groups	5	5	5	5	5	5

Legend: * p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors are clustered both at the individual and session level.

dummy for Ineq_30_R, opposite in sign — positive for those who believe they are Player A, and negative for those who believe they are Player C — which confirms that subjects vote according to their beliefs.

In the first column of Table 9, we can see that when a veil of ignorance operates, inequality plays an important role in the tax rate decisions of those group members who believe they are type A. Indeed, we observe that the coefficients of $Ineq\_30\_R$ and $Ineq\_130$ are positive and significant, which means that individuals vote for a higher tax rate in these states of the world than thay do in Ineq_10, the omitted state of the world. The strength of individuals' beliefs is also important, as the significant coefficient of *strong_belief* shows in columns (2) and (3). These results are robust even controlling for risk aversion and for the variables we measured in the ex-post questionnaire, as column (3) shows.

Differently, when looking at the behavior of those group members who believe themselves

to be type C, we find no strong evidence of inequality concerns. In the fourth column of Table 9, there is no significant difference between the tax rate voted in Ineq_90, characterized by an inequality level of 90 points, and Ineq_10, the omitted category where inequality is equal to 10 points. Additionally, the result of comparing Ineq_10 and the state of the world where the inequality level is equal to 130 points, observable in the significant coefficient of $Ineq\_130$ in the fourth column, is not robust to the inclusion of control variables (columns (5) and (6)). In the same vein, the strength of beliefs does not influence the voted tax rates. Also, having more experience as the best performer in the society affects the voting behavior of those individual who believe they are Player C in Ineq_30_R differently than it does in Ineq_10: subjects in the former state of the world are more likely to ask for redistribution, as the significant coefficient of the interaction term *Ineq_30_R*ProportionA* shows.
Overall, our results provide only partial support to Hypothesis 4. When ignorant of their relative ranking in the society, individuals who believe they are Player C indeed vote to maximize their income, while those individuals who believe they are Player A are also motivated by inequality aversion, providing additional evidence on the role of the veil of ignorance in making stakeholders more equality-concerned than when they are informed (Becchetti et al., 2011), which, on top of influencing responses to moral dilemmas, shows veil of ignorance reasoning to favor the *greater good* (Huang et al., 2019).

6 Conclusion

In this paper, we conducted an experiment to investigate individuals' preferences for redistribution in which we varied whether individuals were perfectly informed about their relative gross income position or not, respectively in the Baseline treatment and in the Veil of Ignorance treatment; whether self-interest was at stake in the redistributive process or not; and whether the effect of luck strengthened or weakened the influence of merit on income inequality.
We showed that when subjects had a direct stake in the game and were aware of their wealth position, self-interest was the main driver of their choices. Independently of whether merit accounted for their relative gross income and the level of inequality characterizing the society or luck was the more decisive factor, subjects voted for high redistribution

when they were its beneficiaries, and for low redistribution when they stood to lose by it. When individuals were not informed about their relative gross income, but only about the effect of luck on income inequality, as determined by their performance in an ability task, inequality aversion colored their redistributive choices, an effect that held when risk and belief controls were included, and which was most pronounced among high ability subjects.

Turning to external observers, we found, in the Baseline treatment, that their past experience as high ability earners was associated with their voting for more redistribution when luck reversed the relative (deserved) wealth of individuals. These findings, suggesting that fairness concerns are influenced by personal experience, point in the same direction indicated by recent studies analyzing how subjects' exposure to different institutional environments in the laboratory shapes their social preferences (Cassar et al., 2014; Peysakhovich and Rand, 2016; Galbiati et al., 2018; Engl et al., 2021). Our findings also add to the results by Cassar and Klein [2019], who showed how experience of failure alters people's perspectives on distributive justice. Finally, our findings underline the role of fairness in the external observers' choices in the veil of ignorance treatment, when the recipients of redistribution have no opportunity to form references points, which supports the role of loss aversion in distributive choices (see Charité et al. [2022]).

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Appendix A

A.1 Additional Tables and Figures

In the following graphs we show, for each type of player (or beliefs) the mean tax rate voted in each treatment, by period and state of the world.

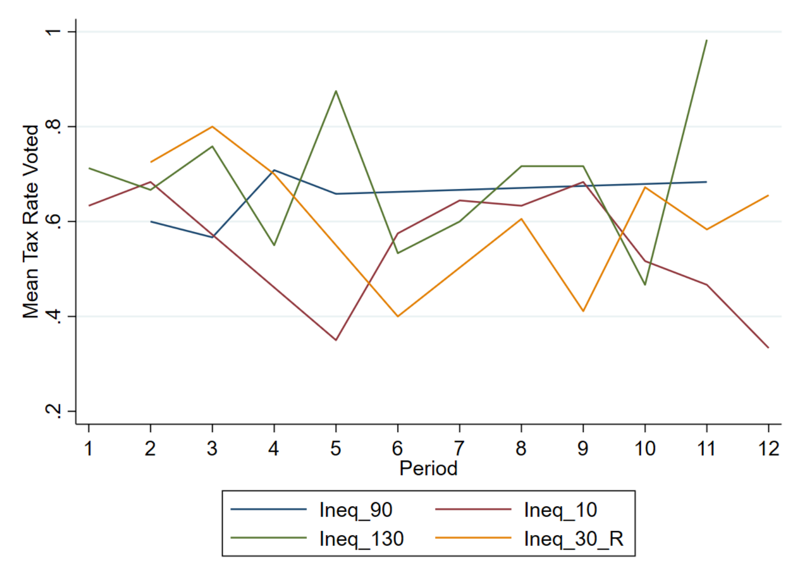


Figure A.1: Mean tax rate voted by the subjects when drawn as type B in the BSL treatment, by period and state of the world.

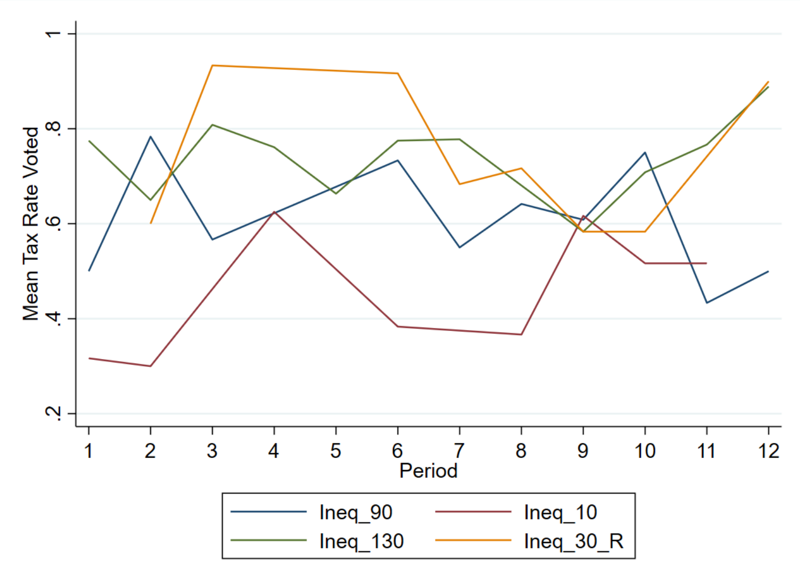


Figure A.2: Mean tax rate voted by the subjects when drawn as type B in the VOI treatment, by period and state of the world.

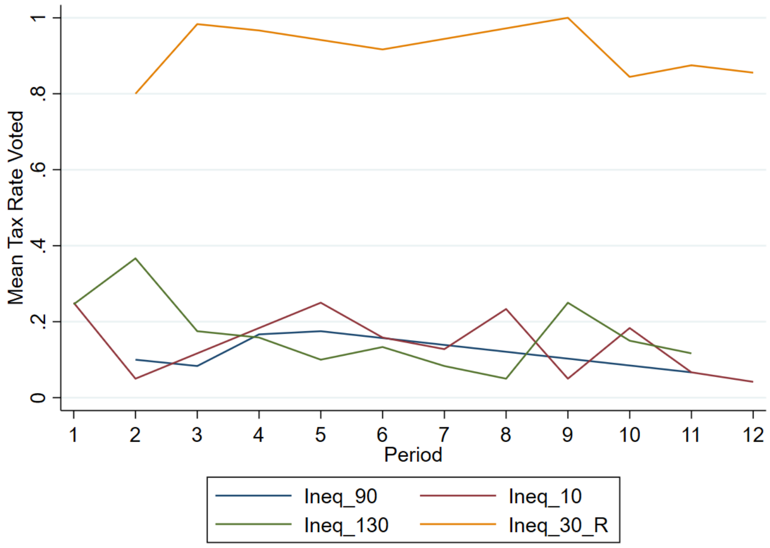


Figure A.3: Mean tax rate voted by the subjects when drawn as type A in the BSL treatment, by period and state of the world.

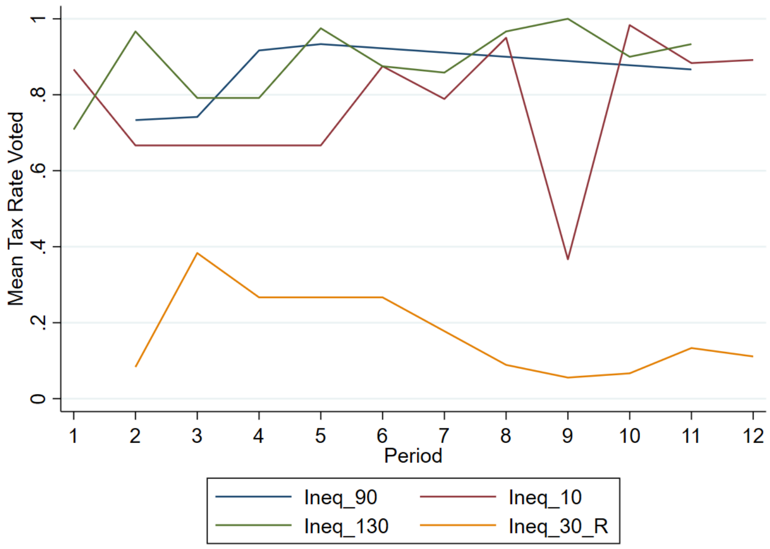


Figure A.4: Mean tax rate voted by the subjects when drawn as type C in the BSL treatment, by period and state of the world.

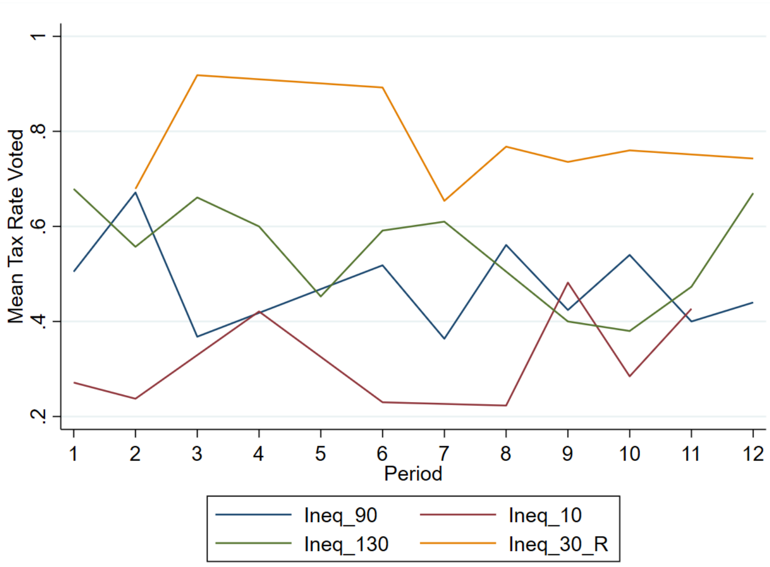


Figure A.5: Mean tax rate voted by the subjects who believe being player A in the VOI treatment, by period and state of the world.

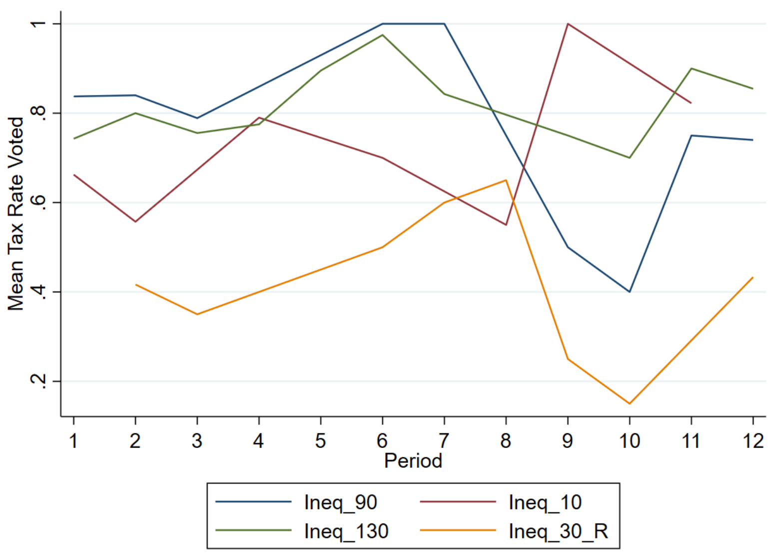


Figure A.6: Mean tax rate voted by the subjects who believe being player C in the VOI treatment, by period and state of the world.

Table A.1: Multi-level regression, the dependent variable is the tax rate voted by B players. Standard errors are clustered both at individual and session level.

Tax_Rate_Voted	(1)	(2)	(3)	(4)
Ineq_10	-0.126***	-0.126***	-0.062	-0.062
	(0.035)	(0.035)	(0.044)	(0.044)
Ineq_90	-0.023	-0.021	0.055	0.047
	(0.036)	(0.037)	(0.054)	(0.054)
Ineq_130	0.070**	0.071**	0.092**	0.093**
	(0.031)	(0.032)	(0.044)	(0.044)
VOI	0.028	0.024	0.114*	0.106
	(0.049)	(0.049)	(0.065)	(0.064)
Ineq_10*VOI			-0.170**	-0.166**
			(0.071)	(0.071)
Ineq_90*VOI			-0.157**	-0.147**
			(0.074)	(0.074)
Ineq_130*VOI			-0.070	-0.069
			(0.063)	(0.063)
prop_PlayerA		-0.007	-0.023	-0.024
		(0.043)	(0.043)	(0.043)
Period		0.001	0.003	0.002
		(0.004)	(0.004)	(0.004)
Risk		-0.013	-0.013	-0.018*
		(0.009)	(0.009)	(0.009)
Female		0.038	0.035	0.015
		(0.038)	(0.037)	(0.039)
Constant	0.641***	0.683***	0.652***	0.624***
	(0.039)	(0.075)	(0.077)	(0.126)
Controls	NO	NO	NO	YES
Log likelihood	-210.168	-208.005	-204.263	-198.694
Wald chi2	38.970	43.480	51.470	63.920
Prob >chi2	0.000	0.000	0.000	0.000
Observations	720	720	720	720
Number of groups	10	10	10	10

In Table A.1 we further test the effect of the veil of ignorance on the redistributive choices of external observers. More specifically, in column (1), we only include in the regressions the states of the world, with Ineq_30_R being the omitted one, and the treatment variable, which is equal to 1 for the VOI treatment and equal to 0 for the BSL treatment. In column (3), when adding the interactions between these variables, we observe that indeed the voting tax rate is significantly higher in Ineq_30_R with respect to both Ineq_10 and Ineq_90 under the VOI treatment. We also see, as evidenced in the main text, that in the BSL treatment the tax rate voted is significantly higher in the Ineq_130 than in the Ineq_30_R state of the world, as shown by the significant coefficient of *Ineq_130* variable in both columns (3) and (4). Finally, the significant coefficient of the *VOI* variable indicates that external observers are more likely to ask for redistribution in the VOI treatment than in the BSL treatment when considering the Ineq_30_R state of the world, as already suggested in Table 3 in the main text.

In Table A.2 we consider the determinants of the behavior of agents who believe they are Player A or C with equal probability, and we refer to as "uncertain subjects". More specifically, in Table A.2 we report the coefficients of a series of multi-level regression models, with standard errors clustered both at the session and at the individual level, where the dependent variable is the tax rate voted by "uncertain subjects". From column 1 it can be seen that these subjects exhibit inequality aversion, as shown by the positive and significant coefficients of $Ineq\_30\_R$, $Ineq\_90$ and $Ineq\_130$. Additionally, in columns 2 and 3, we observe that having been the best performers in previous periods more positively influences the willingness of uncertain subjects to redistribute in the state $Ineq\_30\_R$ than it does in the state of the world $Ineq\_10$. The behavior of uncertain subjects is similar to that observed in the analysis of external observers (see Table 5), which is reasonable, given they do not have strong beliefs about their actual gross income relative ranking.

Table A.2: Multi-level regression, the dependent variable is the tax rate voted by subjects who are unsure of whether they are subject A or C after having performed the ability test in the VOI treatment. Standard errors are clustered both at individual and session level.

Tax_Rate_Voted	(1)	(2)	(3)
Ineq_30_R	0.166**	-0.027	-0.022
	(0.075)	(0.131)	(0.131)
Ineq_90	0.106*	0.241**	0.229**
	(0.064)	(0.114)	(0.113)
Ineq_130	0.216***	0.283***	0.310***
	(0.058)	(0.105)	(0.106)
prop_PlayerA	-0.029	0.052	0.068
	(0.087)	(0.152)	(0.154)
Ineq_30_R*prop_PlayerA		0.417*	0.440**
		(0.222)	(0.221)
Ineq_90*prop_PlayerA		-0.301	-0.272
		(0.195)	(0.195)
Ineq_130*prop_PlayerA		-0.155	-0.187
		(0.182)	(0.181)
Period	0.009	0.008	0.011
	(0.006)	(0.006)	(0.007)
female			0.116*
			(0.066)
risk			-0.006
			(0.017)
Constant	0.381***	0.349***	0.474**
	(0.078)	(0.099)	(0.242)
Controls	NO	NO	YES
Log likelihood	-41.057	-35.333	-29.114
Wald chi2	17.370	30.180	45.000
Prob >chi2	0.004	0.000	0.001
Observations	179	179	179
Number of groups	5	5	5

A.1.1 The role of gender

We observe that in the BSL treatment while males, are overall, provided more correct answers than females (2.79 vs. 2.47, MW test, $p = 0.001$), they are almost equally likely to be assigned the role of Player A (respectively, females and males were assigned the role of Player A 47% and 53% of the times; chi2 test, $p = 0.1$). In the following, we analyse the beliefs of men and women about being the best (player A) or worst (Player C) performers in the ability task in the VOI. Even when, in the VOI treatment, the gender difference in performance is bigger (2.87 vs. 2.26, MW test, $p = 0.000$), which makes males more likely to be assigned the role of Player A (chi2 test, $p = 0.00$), they overestimate their ability:

70.37% (16.67%) of males believe they're Type A (Type C), while 56.33% (24.70%) of females believe they're Type A (Type C).

Table A.3 shows the distribution of the frequencies of the beliefs by gender. The rows indicate the "Belief elicitation" where 1 stands for *"I believe I am player A"* and 5 stands for *"I believe I am player C"*. The two columns "Player A" and "Player C" divide the belief elicitation frequencies among the actual results.

Table A.3: Distribution of frequencies of the beliefs elicitation phase, by gender.

		Who I actually am			
		Player A		Player C	
	Beliefs	Female	Male	Female	Male
Who I believe I am	I believe I am player A	42.63%	60.59%	28.69%	47.41%
	I do not know	25.79%	18.24%	30.33%	21.55%
	I believe I am player C	31.58%	21.18%	40.98%	31.03%

From this distribution, it is possible to see that men are more overconfident than women, as suggested by previous experimental evidence (see Kamas and Preston, 2012): 48% of males believe they are player A when actually they are player C, against 28% of females (MW test: $p = 0.001$). Females, instead, are relatively underconfident: 32% of females but only 20% of males who were actually the best performers in the task believe they were the worst performers (MW test: $p = 0.026$).

Appendix B

Experimental instructions

WELCOME

Welcome and thank you for participating in this experiment.
In this experiment there are 18 participants. The experiment will last about one and a half hours. For your participation you will receive 4 euro and you will have the opportunity to earn more money depending on your decisions and the behavior of other participants you will interact with, according to the rules that will be described in what follows. Your earnings will be paid to you immediately at the end of the experiment. Your decisions and income will be kept confidential.

The experimenter will now read the instructions aloud. Once the reading of the instructions is finished, please raise your hand if you have any questions, a research assistant will come to your desk and answer your questions in private. You will be then asked to answer a few questions to verify your understanding of the instructions and then the experiment will start. At the end of the experiment a short questionnaire will be conducted.

Please switch your mobile off and do not talk to each other during the experiment. During the experiment you can raise your hand at any time so that a research assistant will come to your desk and answer your questions in private.

INSTRUCTIONS

The experiment consists of twelve rounds. In each round, you and the other participants will be asked to answer questions and make choices.

At the end of the experiment, one of the twelve rounds will be randomly drawn and the gain you will have obtained in that round will be paid to you in cash, in private, by presenting the ticket you extracted when entering the laboratory. The gain in the experiment is expressed in tokens. The exchange rate with which the tokens are converted into euro is 1 token = 0.1 euro.

At the beginning of each round, you and the other participants will be randomly assigend into groups of three individuals. The groups are reshuffled and randomly reformed at the beginning of each round.

Each group of three individuals is always composed of three types of components: A, B and C. At the beginning of each round, one member in each group is randomly drawn as a type B component and the outcome of the draw is communicated to the entire group. Type B component is assigned a fixed income of 75 tokens. The remaining two members of each group will be respectively assigned to type A and C depending on the outcome of an ability test. The ability test consists, in each round, of five closed-ended questions to answer which the two participants will have two minutes of time. The type B player, during these two minutes, will see the questions presented to the other two members of his group in the ability test, even though he has no opportunity to answer them.

The ability test is characterized as follows:

- The questions are taken from psychometric tests, in subjects ranging from logic, history, mathematics and general culture.
- Each question is presented one at a time. To answer the question you must select the option you prefer and then click on the "OK" button. After answering a question, a new one will appear on the screen.

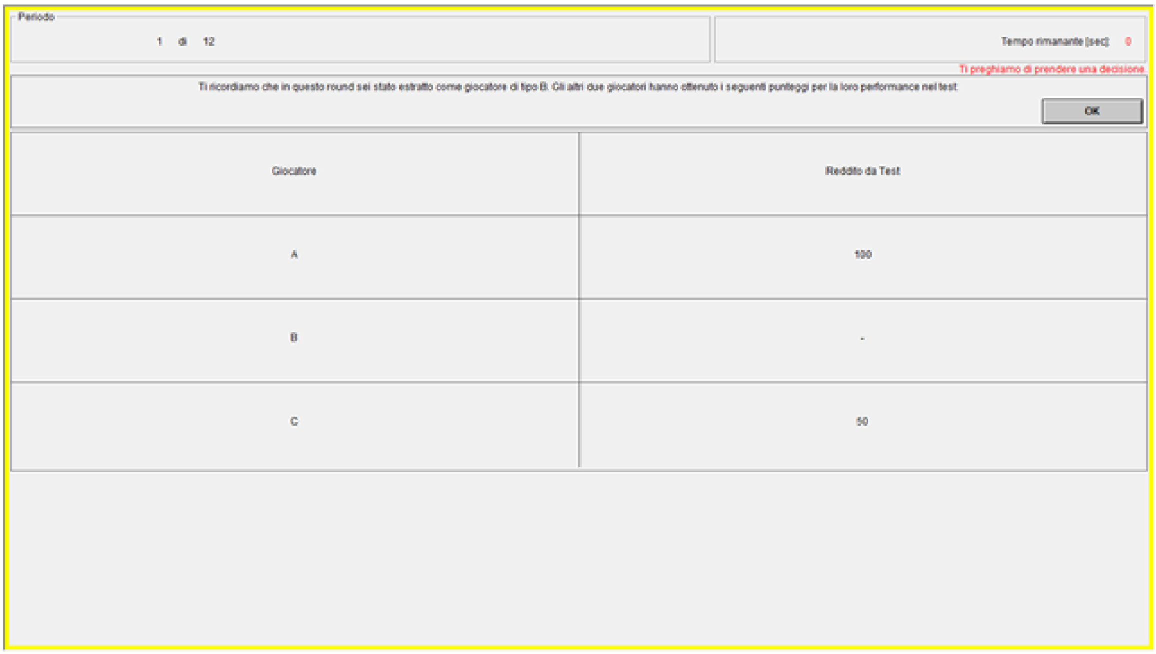
- Remember, once you have clicked on the "OK" button it is not possible for you to change your chosen option.
- If a participant finishes answering the questions before the two minutes, a waiting screen will appear on the monitor. Conversely, if a participant does not manage to finish the questions within two minutes, only those that have been answered will be considered valid to compute his outcome from the ability test.
- The remaining time will be displayed in the upper right corner of the monitor. For each question there are four possible options, plus an "I don't know" option.
- Only one of the four options is correct, the other three are incorrect. Based on the chosen option, you can get +1 point if you choose the correct one, -1 point if one of the wrong one is selected, 0 points if the "I don't know" option is chosen.

In each group, at the end of the ability test, the assignment of types A and C will be determined as follows:

- The group member who performs best in the ability test will be assigned the role of type A, while the group member who performs worst in the ability test will be assigned the role of type C.
- In the case of a tie, namely the two group members receive the same amount of points from the ability task, A and C types will be assigned according to which group member took the shortest and longest time, respectively, to answer the questions.
- Finally, should the two group members receive the same amount of points from the ability task and also take the same time to answer the questions, types A and C will be randomly assigned to the two group members.

100 tokens will then allocated to type A, while type C is allocated an income of 50 tokens.

At the end of the ability test, the corresponding type and income will be communicated to each group member, as shown in the following screen shot.

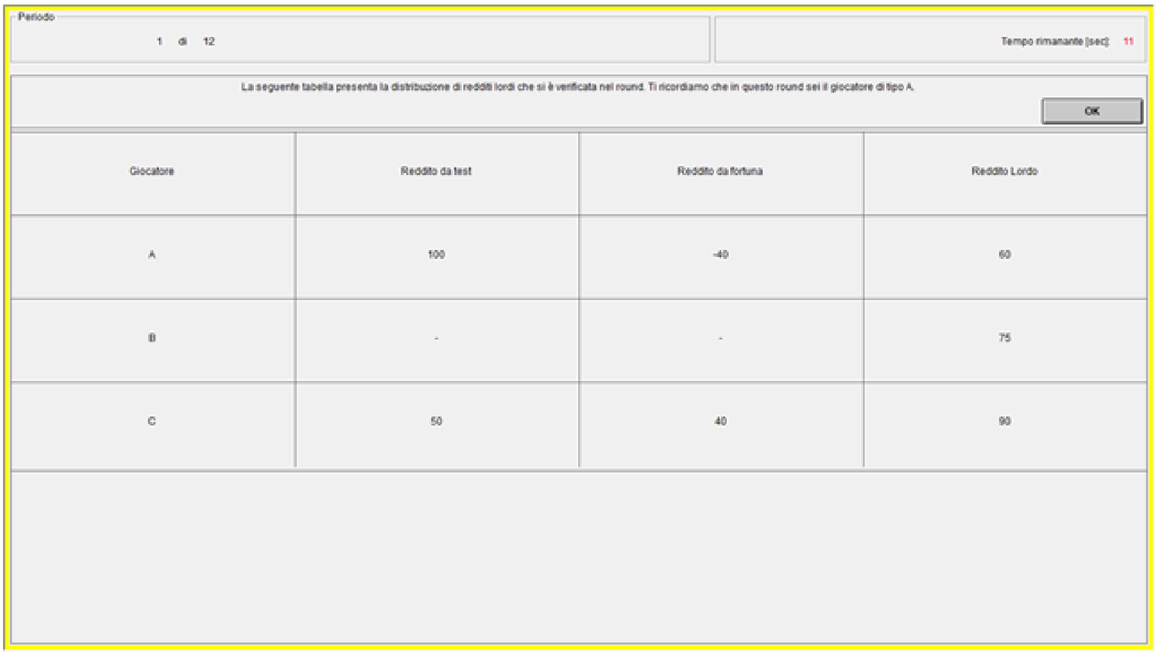


In each round, following the ability test and the assignment of player types, there will be a luck shock that modifies the income of A and C. The shock can, with equal probability, be of low or high intensity and it can be positive or negative.

- In the case the shock is of low intensity, the income of one of the two players A or C will be randomly selected and be increased by 20 tokens; the income of the other player will therefore be decreased by 20 tokens. Player B's income will remain unchanged.
- In the case the shock is of high intensity, the income of one of the two players A or C will be randomly selected and be increased by 40 tokens; the income of the other player will therefore be decreased by 40 tokens. Player B's income remains unchanged.

When the luck shock has changed the income of types A and C group members, a screen will summarize the distribution of income for each member of the group, which we now define as "gross income".

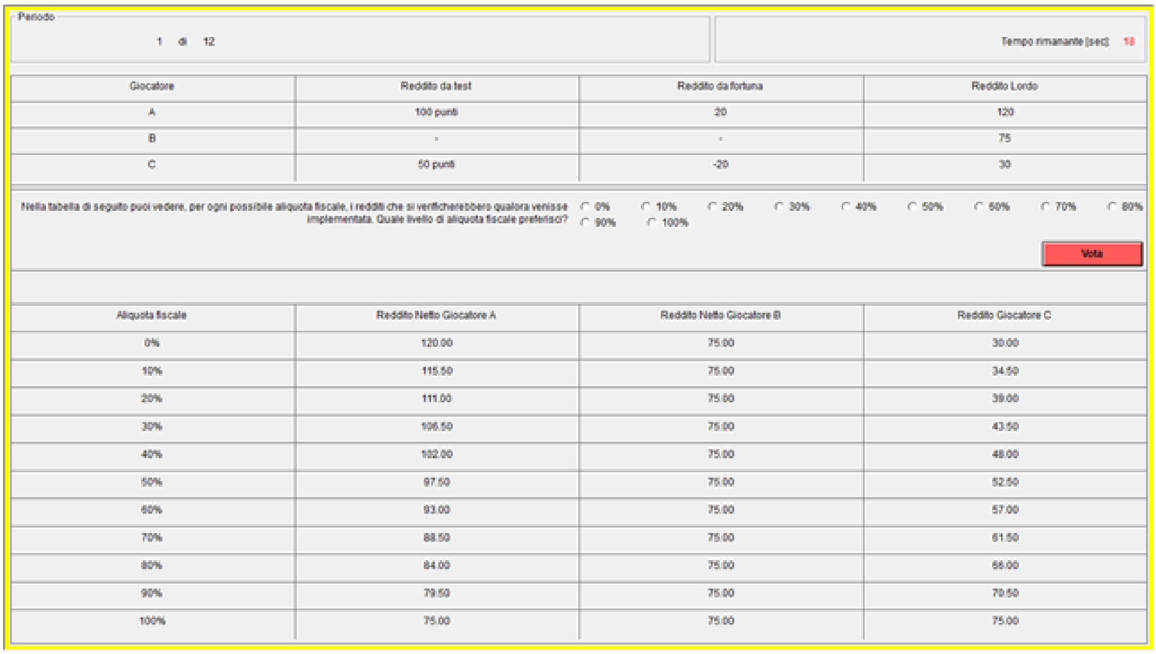
In the following screenshot we see an example of how, following the ability test, there was a high intensity random luck shock that decreased Player A's income by 40 tokens while increasing Player C's income by 40 tokens. Gross income is then 60 tokens for player A, 75 tokens for player B and 90 tokens for player C.



After each member of each group is informed of the distribution of gross incomes in their group, each member of each group will have to make a choice. Specifically, each participant must select the level of tax rate they would like to be applied to their group's gross income distribution. To facilitate the choice, for each tax rate , the distributions of net income that would occur for each member of the group if each possible rate were implemented are shown to each participant.

The proposed rates range from 0%, which preserves the distribution of gross income, to 100%, which results in all group members receiving the same amount of tokens, namely 75 tokens. All intermediate rates, from 10% to 90% progressively allow a reduction in the inequality of net incomes between the richest and the poorest player in the round.

Below an example of the screen you will see when you will have to choose the tax rate you would like to be applied to the gross income of your group.



Periodo

1 di 12

Tempo rimanante [sec]: 18

Giocatore	Reddito da test	Reddito da fortuna	Reddito Lordo
A	100 punti	20	120
B	-	-	75
C	50 punti	-20	30

Nella tabella di seguito puoi vedere, per ogni possibile aliquota fiscale, i redditi che si verificherebbero qualora venisse implementata. Quale livello di aliquota fiscale preferisci?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Vota

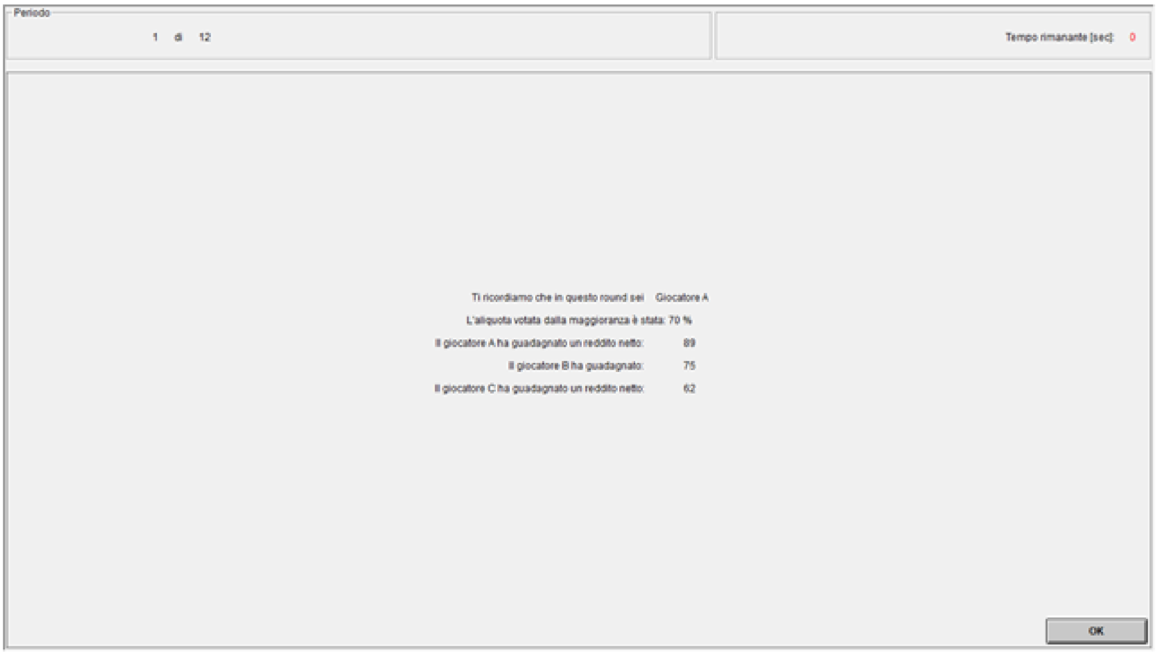
Aliquota fiscale	Reddito Netto Giocatore A	Reddito Netto Giocatore B	Reddito Giocatore C
0%	120.00	75.00	30.00
10%	115.50	75.00	34.50
20%	111.00	75.00	39.00
30%	106.50	75.00	43.50
40%	102.00	75.00	48.00
50%	97.50	75.00	52.50
60%	93.00	75.00	57.00
70%	88.50	75.00	61.50
80%	84.00	75.00	66.00
90%	79.50	75.00	70.50
100%	75.00	75.00	75.00

Once each member of the group has confirmed his choice, the tax rate implemented to define the effective distribution of the group's net income for the current round will therefore be the one preferred by the majority, that is, the highest tax rate that at least two out of the three group members are willing to accept.

In particular:

- Suppose that all three members of the same group voted for the same tax rate, equal to 20%. The rate implemented will therefore be equal to 20%.
- Suppose that two members of the same group vote for the same tax rate, equal to 40%, and the third member of the group votes for a tax rate of 70%. The rate implemented will therefore be equal to 40%, that is, the rate voted by two out of the three individuals.
- Finally, suppose that the three members of the same group vote for three different rates equal to, respectively, 30%, 50% and 80%. The implemented rate will therefore be equal to 50%, or the highest rate that at least two out of the three individuals would be willing to accept.

Each member of the group is therefore informed of both the tax rate implemented and the distribution of net income resulting from its implementation, as shown in the example screen below.



What happens now?

Now you will have to answer a few questions to check that everything about the functioning of the experiment is clear to you. As soon as all the participants have completed the questionnaire, the first round of the experiment will begin.

You can raise your hand at any time with any query. An assistant will come to you to answer your questions privately.