When is Inequality Fair?
An Experiment on the Effect of Procedural Justice and Agency[1]

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Abstract

We investigate how the perceived fairness of an income distribution depends on the beliefs about the process that generates the inequality. Specifically, we examine how two crucial features of this process affect fairness views: (1) Procedural justice - equal treatment of all; (2) Agency – one's ability to determine his/her income. We do this in a lab experiment by differentially varying subjects' ability to influence their earnings. Comparison of ex-post redistribution decisions of total earnings under different conditions indicate both agency and procedural justice to matter for fairness. Highlighting the importance of agency, we observe lower redistribution of unequal earnings resulting from risk when risk is chosen freely. Highlighting the importance of procedural justice, we find introduction of inequality of opportunity to significantly increase redistribution. Despite this increase, under inequality of opportunity, the share of subjects redistributing none remain close to the share of subjects redistributing fully revealing an underlying heterogeneity in the population about how fairness views should account for inequality of opportunity.

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1. Introduction

In many countries, economic inequality is at its highest level in 30 years.[2] How and to what degree this should be mitigated is a crucial social and political debate. The debate on inequality is ultimately about balancing two potentially opposing factors: rewarding higher productivity in society while compensating unfair differences in outcomes.[3] The economics literature has traditionally focused on how to optimally address efficiency concerns, while factors affecting the perceived fairness of the income distribution have received less attention. However, ultimately, the debate on redistribution is shaped by both concerns.

In this paper, we focus on how fairness views on the income distribution depend on the process that generates heterogeneity in the income distribution. We examine how two crucial features of this process affect fairness views: (1) Agency (one's ability to determine his income): Are people held accountable for the choices they make that consequently influence their income? (2) Procedural justice (equal opportunity for all): Does equality of opportunity matter for fairness?[4]

According to the agency interpretation, inequality in earnings can be considered fair only if people can be held personally responsible for these differences, for example, because of the choices they have made. According to the procedural justice interpretation, inequality in earnings can be considered fair only if all the involved parties face equal prospects ex-ante, i.e. they face equal opportunities. Alternatively, it could be that both are necessary conditions for inequality in outcomes to be deemed fair. We test both of these theories, with the hope that a better understanding of fairness and whether its source is agency or procedural justice can lead to different interpretations of fairness and to different redistributive policies.

The following examples give us intuition about how agency and procedural justice could direct us towards different notions of fairness. We wouldn't expect most people to support a program that effectively redistributes from those who chose STEM majors in college to those who chose another major (where earnings are on average much lower). Generally, most of us would consider

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[2] In OECD countries, as of 2015, the richest 10% of the population earns 9.6 times the income of the poorest 10%. This ratio stood at 7 in the 1980s, rising to 8.1 in the 1990s and 9.1 in the 2000s. Source: OECD report 2015.

[3] Technology and globalization have magnified differences in productivity and returns to education. Hence, if earnings are to represent marginal productivity to maximize incentives, rising inequality is an inevitable outcome. At the same time, many consider economic inequality to be a growing social problem. Studies reveal a rising divergence between people's "ideal" income distribution and the actually observed distribution today (Norton and Ariely 2011).

[4] Both agency and procedural justice are historical concepts with a range of interpretations in different contexts. For the purposes of this paper, we use agency to capture accountability, ability to influence final outcomes; and procedural justice to define a version of ex-ante fairness in outcomes, that is, all agents face the same income generating process.

differential earnings resulting from choices for which agents are personally responsible to be fair. In this context, agency is driving our perception of fairness. But, what if the option of choosing a STEM major was not available to some agents either due to financial or cognitive constraints? Ultimately, the agents cannot be held responsible for such differences in ex-ante opportunities. Here, procedural justice and agency cannot be viewed as two separate considerations, but they operate simultaneously and it is not clear which one is more important. Finally, would we feel differently about redistribution among agents who had equal opportunities and made identical choices, which however still resulted in differential earnings due to unforeseen external factors? Here, agency and procedural justice can point to different notions of fairness.

To study how fairness views on the income distribution depend on beliefs about the process that generates inequality, we conducted a lab experiment where we varied the income generating process. We compare ex-post redistribution decisions on total earnings in these environments. Our treatments differ only in the process that generates the inequality. We vary equality of opportunity (procedural justice) and one's ability to make choices (agency), which consequently influence their income. After the initial earnings were determined, in the redistribution stage, we asked impartial observers (they did not participate in the initial earnings stage and were paid a fixed show-up fee) and the involved parties ("stakeholders") how they would redistribute total earnings between the income earners.

In our first treatment (Equality-Choice), subjects first faced a risk-taking phase where they choose between a risky option with a higher expected value and a safe option with a lower expected value. Pre-redistribution earnings depend on luck only if the subjects choose the risky option. In our second treatment (No-Choice), the risk-taking phase was removed and the pre-redistribution earnings for subjects were determined entirely by random draws of the computer. Note that both of these treatments satisfy procedural justice. That is, stakeholders are treated identically and they face the same income generating process. In Equality-Choice, they have identical choice sets; in No-Choice, they face equal prospects. However, the two treatments differ in terms of whether or not subjects have agency. In the No-Choice treatment, subjects have no control over their earnings (no agency). In the Equality-Choice treatment, subjects have the option to take the safe option, and thus have some control over their earnings (agency).

In the third treatment (Inequality-Choice), we introduce inequality of opportunity by eliminating some subjects' opportunity to choose the risky option. To the best of our knowledge, this

is the first laboratory experiment studying how inequality of opportunity, in terms of constraints on choices over risk, affects fairness views. The stakeholders without a choice are slightly disadvantaged as they are automatically assigned the safe option, which has a lower expected value. Inequality-Choice treatment violates procedural justice, as the subjects are not treated equally: only a subset of the subjects enjoy agency. This third treatment allows us to study how agency and procedural justice interact. Namely, we are able to investigate how much the presence of agency, for only one agent, matters for fairness in contexts where there is inequality of opportunity.

In summary, we tackle the following questions in this paper: Do we consider inequality to be fair only when we can hold the involved parties accountable for the realized differences? Most importantly, how much do our views on fairness change when there is inequality of opportunity, specifically when there is partial agency due to differences in choice sets?

Our analysis provides the following main results. First, we find that procedural justice -equal opportunity for all – is not considered as a sufficient condition for fairness. Most subjects choose to fully redistribute and equalize earnings in the No-Choice treatment despite the equal prospects that all subjects faced ex-ante. On the other hand, we observe the majority of the subjects redistribute little or none in the Equality-Choice treatment. The stark contrast between these two treatments implies agency to be a crucial factor for forming views on fairness. Surprisingly, in the Equality-Choice treatment, low redistribution is also observed in cases where subjects make the same choices, and differences in outcomes are only due to luck. This suggests that inequality due to luck is considered to be fair when risk is chosen freely, but not fair when it is externally imposed, highlighting the importance of agency further.

Comparison of Equality-Choice with the Inequality-Choice treatment reveals that, at least for a subset of the subject population, procedural justice is necessary for fairness. We find that violation of procedural justice, by introducing inequality of opportunity, increases redistribution: the share of subjects who choose to redistribute fully significantly increase. However, redistribution levels remain significantly different from the No-Choice treatment. Analyzing the histogram of redistribution decisions under inequality of opportunity, we observe, unlike the other two treatments, an underlying heterogeneity in the population about how our fairness views should account for inequality of opportunity when there partial agency.[5] The variation in the redistribution decisions

[5] In the Inequality-Choice treatment, the share of the population choosing to redistribute equally (27 percent) is roughly the same as to the share of the population choosing to redistribute none (31 percent).

indicate that while some subjects hold people with agency accountable for their earnings when risk is taken (rewarding them when they are lucky and punishing them otherwise), others disregard agency altogether when there is inequality of opportunity and choose to equalize payments.

1.1 Literature Review

Our experiment is inspired by the broader discussion on equality of opportunity in political philosophy. Responding to the welfarist tradition interpreting egalitarianism as equality of welfare, Rawls (1971) first emphasized the role of the process that generates outcomes in fairness judgments. Sen (1980), Dworkin (1981a, 1982b), Arneson (1989), Cohen (1989), and Roemer (1993, 1998) and Fleurbaey (2008) have argued for personal responsibility as a key criterion for fairness.[6] Thus, since Rawls, the development of egalitarian theory can be characterized as an effort to replace equality in outcomes with equality of opportunity. The crux of the debate is on establishing the realm of personal responsibility and circumstances that affect outcomes outside this realm. Dworkin (1981a) distinguishes between *brute luck* and *option luck*, where option luck results from deliberate risk choices. He argues that unequal outcomes resulting from option luck need not be compensated. Fleurbaey (2008) challenges this view arguing that agents cannot be held responsible for differences in outcomes resulting from realizations of the same lottery.[7] While high levels of redistribution in our No-Choice treatment (in contrast to Equality-Choice) highlight the importance of personal responsibility in fairness views, closer look at redistribution decisions in the Equality-Choice treatment provides a particularly interesting set of results in the context of this debate between Dworkin and Fleurbaey. In our Equality-Choice treatment, when both stakeholders choose the risky option but get different outcomes (25-4), Dworkin's view suggests no redistribution (case of option luck), while Fleurbaey argues for full redistribution. We find heterogeneity in observer redistribution decision with evidence for both views.

Most importantly, our experiment provides clear evidence for how people account for inequality of opportunity when there is still scope for personal responsibility. While all theories argue that agents should be compensated for ex-ante inequalities in opportunities, there is disagreement on how such inequalities should be measured, and the degree to which they grant

[6] We refer to the reader to Romer and Trannoy (2015) for an excellent review of this literature.
[7] Lefranc, Pistolesi & Trannoy (2009) provide more nuanced approach to incorporating luck, introducing *residual luck* as a third category which they recommend should be compensated, but not fully.

compensation.[8] Our Inequality-Choice treatment provides evidence for how people trade-off two foundational principles in theories of justice founded on equality of opportunity: compensation of differences for which people cannot be held responsible for, and rewarding of differences which can be tied to individual choices. Bimodal distribution of redistribution decisions in this treatment reflect social disagreement along this dimension.

Our paper also contributes to a large experimental and behavioral literature on social preferences. Many studies have consistently shown that subjects are willing to take costly actions that only benefit others and potentially achieve more equitable outcomes in the context of the dictator, gift exchange and public good games (refer to Camerer (2003); Schokkaert (2006) for an overview). These results have motivated models of social preferences.[9]

The importance of agency and procedural justice in forming fairness views is suggested by both observational and experimental studies. Observational studies have long shown a link between fairness views and beliefs about the causes of inequality. For example, Alesina et al. (2001) find that redistributive policies observed across developed economies correlate with public opinion about the main causes of income inequality. Interestingly, the correlation is observed most remarkably when the United States is compared to Europe. Americans, who currently face much lower levels of direct and indirect redistribution then Europeans, are twice as likely than Europeans to think that it is hard work, rather than luck and social connections, that predominantly determines one's income (World Values Survey, 2007).[10] Konow (2003) and Gaertner and Schokkaert (2012) provide an overview of the questionnaire studies on distributive justice. These studies suggest the idea that agency plays a crucial role in fairness judgments.[11]

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[8] A simple cardinality measure of the choice set indicates clear inequality in opportunity in the Inequality-Choice treatment, while a measure focusing on best achievable options (for sufficiently risk-averse agents) might not suggest so.

[9] Fehr and Schmidt (1999), Charness and Rabin (2002); Engelmann and Strobel (2004), Andreoni (1990), Andreoni and Bernheim (2009); Benabou and Tirole (2006); Dana, Weber and Kuang (2007) are prominent papers in this literature.

[10] Similarly, looking at variation within the United States, Alesina and Ferrara (2005) find that people who believe that the American society offers 'equal opportunities' to be more averse to redistribution. Fong (2001) using Gallup Poll data for the US finds that such beliefs about the source of income differences (merit or luck) have an independent effect on preferences for redistribution, which cannot be explained through self-interest. Recently, Almas et al. (2016) study differences in fairness views across different societies using nationally representative samples from the United States and Norway. There is also a theoretical literature that studies how beliefs about the income distribution can affect equilibrium redistribution policies. (Alesina Angeletos (2005), Piketty (1995)). Furthermore, Benabou and Ok (2001) and Benabou, Tirole (2011) model heterogeneity of beliefs on the income distribution.

[11] For example, Konow (2003) finds students to consider differences in outcomes linked to health conditions to be unfair, while differences linked to effort to be fair. Gaertner and Schwettmann (2007) study whether health conditions that agents are born with are treated differently than health conditions resulting from accidents where there could be scope for personal responsibility. They don't find significant differences.

On the experimental side, the effect of agency (being able to influence one's own income) on fairness views has been primarily studied with the use of dictator and ultimatum games. Konow (2000) and Cherry, Frykblom, and Shogren (2002) show that dictators are more likely to allocate in proportion to subjects' earnings when differences in those earnings are due to variables that subjects can take personal responsibility for, but are more likely to favor equal splits when differences are due to exogenous variables. Hoffman and Spitzer (1985) and Hoffman et al. (1998) find that proposers are more likely to make unequal offers, and respondents are less likely to reject them, when subjects are told their roles in the ultimatum game were determined by their performance in a task. In the context of a public goods game, Clark (1998) finds willingness to vote for redistribution to decrease when initial endowments depend on previous relative performance. In another study on the determinants of redistributive preferences, Durante et al. (2014) find similar results. Overall, these papers suggest redistributive preferences to be responsive to whether earnings are randomly assigned or a function of previous achievement.[12] We should emphasize that our notion of agency is related but distinct from this literature that links observed inequalities to relative performance. We limit subjects influence over outcomes to their choices over lotteries.

There is much less experimental work studying perception of fairness in contexts where there is some agency but *not* equality of opportunity. Krawczyk (2010) compares redistribution decisions under two conditions: one in which the inequality is randomly determined, and one in which it is the result of a tournament involving effort. In line with previous findings, the results highlight the importance of agency and corroborate the conjecture that support for redistribution is affected by the perceived determinants of the inequality in outcomes. Redistribution (which takes place behind a veil of ignorance before outcomes are determined) is lower in treatments where outcomes are linked to subjects' performance. However, greater inequality of opportunity - measured by dispersion of probability of winning the tournament within a group - does *not* lead to higher redistributions. In the context of our design, we introduce inequality of opportunity in a very salient manner by directly

[12] Although not directly designed to investigate the role of agency on fairness views, several other papers point to such a link. Bolton, Brandts and Ockenfels (2005) use ultimatum and battle-of-the-sexes games to look at the trade-off between how an outcome is determined and the fairness of the outcome from recipients' perspective. Relatedly, Bohnet and Zeckhauser (2004) and Bohnet et al. (2008) analyze how players in a trust game adjust acceptance rates depending on whether an actual person or a random process determines the outcome of the game.

restricting the choice set faced by the disadvantaged agent. In contrast to Krawczyk (2010), we find willingness to redistribute to increase when we introduce inequality of opportunity.[13]

Cappelen et al. (2007) and Cappelen et al. (2013) both study prevalence of different types of fairness norms. In the early paper, subjects make costly effort choices to earn income in a production game (with returns to effort varied exogenously); in the later paper, subjects make choices on how much risk to carry. By comparing redistribution decisions among groups with different choices and ex-post earnings, they are able to structurally estimate the distribution of weights attached to different notions of fairness. Both papers find redistribution decisions to depend on choices as well as outcomes. The emphasis on both choices and the distribution of outcomes in forming fairness views is consistent with results from recent studies on risky dictator games (Brock et al. 2013; Krawczyk and Le Lec 2010) which hint at both ex post and ex ante fairness concerns to be at play in explaining dictator behavior.[14] We differ from the existing literature by introducing inequality of opportunity in terms of choice sets, focusing on an environment where it is associated with partial agency.

In a concurrent study, Mollerstrom, Reme and Sorenson (2015) ask how people's fairness ideals compare between situations involving bad luck that is the result of a choice (bad option luck) and those involving bad luck resulting from randomness that cannot be avoided (bad brute luck). Contrary to an agency model differentiating between these two situations, they find evidence that compensation for bad brute luck can be conditional on the choice of the agent under option luck.

Following this literature, we study agency and procedural justice in environments where there is uncertainty over outcomes. In the context of our research question, this allows us to compare fairness views across environments that differ in terms of agency and procedural justice but give rise to the same distribution of outcomes. Moreover, it allows us to observe inequality in outcomes even when subjects make identical choices under identical conditions.[15,16]

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[13] Caballero (2014) studies inequality of opportunity in a probabilistic dictator game. He finds that dictators do not consider receivers' opportunities nor their own opportunities when redistributing.

[14] Cappelen et al. (2014), Cettolin and Tausch (2015), Chavanne et al. (2014) also highlight how perception of agency affects preference for redistribution.

[15] Despite its prevalent impact on the distribution of income, fairness views about risk-taking has been studied very little and only recently. Other papers that study risk in the context of the dictator game are Klempt and Pull (2010) and Andreoni and Bernheim (2009).

[16] Our paper also relates to recent work on extending social preferences to risky environments: Fudenberg and Levine (2012) take an axiomatic approach to model social preferences that considers both ex ante vs. ex post comparisons to show that ex ante fairness measures usually violate the independence axiom.

Our paper is closest to Cappelen et al. (2013) mentioned above. Our Equality-Choice treatment (involving both agency and procedural justice) is closely related to their experiment[17], and the results from this treatment mostly replicate their results. We build on their work in two ways. First, we examine precisely the connection between procedural justice and agency by studying redistribution decisions in an environment where there is equality of opportunity, but no agency. Second, we keep partial agency and violate procedural justice by introducing inequality of opportunity.

The paper is organized as follows. Section 2 presents the experimental design. Section 3 reports our findings analyzing the choices of observers. Section 4 concludes.

2. Experimental Design

In this experiment, we manipulated two features of the income generating process, agency and procedural justice with three between-subjects treatments: Equality-Choice, Inequality-Choice and No-Choice. Each treatment involved two types of subjects (stakeholders and observers) and two stages (Stage 1 and Stage 2). In Stage 1, stakeholders earned income and in Stage 2, impartial observers redistributed the total income of the stakeholders. Treatments only differed in Stage 1 as to whether the income generating process involved agency or procedural justice (or both). Table 1 summarizes experimental manipulations.

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In all three treatments, first, each participant was randomly assigned to the role of either a stakeholder or an observer. Then, participants were randomly matched into groups of four, each group involving two stakeholders and two observers. Participants were informed of their experimental role (stakeholder/observer) after the instructions for both roles, and for both Stages 1 and 2, were read out loud. Below, we explain the Stage 1 of each treatment in detail.

Equality-Choice: Each stakeholder had the opportunity to make a choice between a safe option that paid \$10, and a risky option that yielded either \$25 or \$4 with equal chance. For those stakeholders who chose the risky option, the computer randomly determined their outcome. Since stakeholders were able to make a choice between the risky and safe option, we consider agency to

[17] We highlight differences in design in the Experimental Design section.

be a feature of this income generating process in this treatment. Also, since both stakeholders faced the same set of options, the income generating process satisfied procedural justice.

Inequality-Choice: One of the stakeholders had the same two options as the stakeholders in the Equality-Choice treatment: a safe option that pays $10 and a risky option that pays $4 or $25 with equal chance. However, the other stakeholder was automatically assigned the safe option and earned $10 for sure. Since there is inequality of opportunity between the two stakeholders, the income generating process violates procedural justice in this treatment.[18] However, there is partial agency as some of the stakeholders still have the option to choose between the risky and safe option.

No-Choice: Stage 1 earnings for the Stakeholders were randomly determined by the computer, such that each stakeholder had 25% chance to earn $4, 25% chance to earn $25 and 50% chance to earn $10.[19] Since all stakeholders faced the same prospects ex-ante, the income generating process satisfied procedural justice. However, there was no agency since the stakeholders did not have any control over their earnings in Stage 1.

When setting up the payment structure for all treatments, the payoff of the two options were chosen so that the risky option had a higher expected payoff than the safe option, and the safe option paid enough to be preferable to the risky option by a decision maker who was sufficiently risk averse. Decisions of the stakeholders in our experiment suggest that this was indeed the case: 5 of 34 stakeholders in the Equality-Choice treatment chose the safe option, while the rest chose the risky option. At the start of the experiment, the rules about stakeholders' options and the payoffs in Stage 1 were explained to all participants. Thus, observers had perfect knowledge about the income-generating process and the payoffs before they made their redistribution decisions.

In Stage 2, which was the redistribution stage, we employed the strategy method. Observers were asked to make redistribution decisions for each possible combination of $4, $10 and $25 stakeholders could have earned in Stage 1. They were told that if they were randomly chosen to be the redistributor in their group, their decision for the realized income combination in their group would apply at the end of the experiment. For each redistribution decision, they were informed about the relevant features of the income generating process and how each stakeholder earned their

[18] Note that which stakeholder had a choice was randomly determined in the experiment. Hence, from an ex-ante point of view, all subjects face equal prospects. In this sense, our experimental design provides a lower bound on how redistribution decisions respond to inequality of opportunity.

[19] In all treatments, whenever Stage 1 income involved risk, to highlight the independence of risk and to make the randomization transparent to the subjects, we implemented the following procedure. The subjects were told that the computer independently assigned a random number between 1 and 100 to each stakeholder, the realization of which determined their Stage 1 income.

income. For example, in the Equality-Choice Treatment one of the questions observers faced reads as follows (A and B denotes the two stakeholders in the group):[20]

"A chose Option R, which was the risky option, and earned $25. B chose Option S, which was the sure option, and earned $10. In total, A and B earned $35. How much do you redistribute to A and B?"

Among our treatments, Equality-Choice is closest to the design of Cappelen et al. (2013). They do not consider an income generating process similar to Inequality-Choice or No-Choice. Also, in their design, subjects make this choice before they are aware of the details of the redistributive stage. Furthermore, the strategy method is not used; hence, the stakeholders make redistribution decisions after the lottery is realized. We opt for the strategy method simply to maximize observations, and we chose to be fully transparent to the subjects about how final earnings will be determined in the beginning of the experiment.[21]

Although our main focus was observer decisions, we also asked stakeholders to redistribute total earnings between themselves and the other stakeholder in Stage 2. Stakeholder decisions were naturally incentivized: In each group, which consisted of four participants, each stakeholder had 25% chance of being chosen as the redistributor of the group, same as an observer.[22]

To summarize, the timing for the experimental procedure was the following. After instructions for the experiment was read, each participant was first randomly assigned to the role of either a stakeholder or an observer. Then, participants were randomly matched into groups of four, each group involving two stakeholders and two observers. Third, stakeholders earned income in Stage 1. Afterwards, both stakeholders and observers made redistribution decisions in Stage 2. Finally, after Stage 2, all participants answered questions about their age, gender and political views. At the end

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[20] A screenshot of the interface seen by the observers is provided in the Online Appendix.

[21] It is possible that the knowledge of the redistribution stage to has an effect on Stakeholder lottery choices. One would expect this effect to increase the frequency with which the risky lottery is chosen. Since the main focus of this experiment is on the treatment effects in Observer decisions, we are not concerned with such a shift. Also, it is natural to study preferences for redistribution in an environment where involved parties are aware of such a redistribution possibility. Finally, our results in the Equality-Choice treatment are qualitatively in line with the findings of Cappelen et al. (2013) (end of Section 3.1 provides further detail on the comparison.), which suggests the design differences to have a limited effect on the reasoning of the Observers.

[22] Stakeholders in the No-Choice condition made redistribution decisions before they learned their Stage 1 income for every possible combination of their own and the other stakeholder's income. In the Equality-Choice and the Inequality-Choice treatments, stakeholders made redistribution decisions after they chose the safe or risky option, but before they learned the outcome of the lottery. One of the questions a stakeholder in the Equality-Choice treatment faced after choosing the risky option reads as follows: "You chose option R, which was the risky option and earned $4 by chance. The other person chose option S, which was the sure option and earned $10. In total, you and the other person earned $14. How much do you redistribute to the other person and to yourself?"

of the experiment, the computer randomly assigned one of four members in each group as the redistributor and the Stage 2 decision of the chosen redistributor for the realized income combination determined stakeholder final payments. Stakeholders received $7 show-up fee in addition to their earnings and observers received a fix payment of $10.[23] Payment structure was clearly explained in the instructions, before participants were assigned to a role. Each session lasted about 30 minutes.[24]

200 NYU students participated in the experiment between November 2012 and February 2013 in a total of 12 sessions, which were conducted at the Center for Experimental Social Science. Each session had 12, 16 or 20 participants and the experiment was computerized and programmed in z-Tree (Fischbacher, 2008).

3. Results

In presenting the results, we focus on observer redistribution decisions.[25] To present the results, first, we define a new variable *redistribution share*, which represents Stage-2 redistribution decisions of observers independent of Stage 1-income combinations:[26]

$$r = \frac{allocate^{low} - low}{high - low}$$

where *r* is redistribution share,

low is the low-income in Stage 1

high is the high-income in Stage 1

$allocate^{low}$ is the amount the observer decides to allocate to the low income stakeholder.

Redistribution share is the amount an observer allocates to a low-income stakeholder in addition to his Stage 1 income as a fraction of the income difference between the low and high-income stakeholder. For example, for the income combination 25-10, if the observer allocates each stakeholder their Stage 1-income, redistribution share is $\frac{(10-10)}{15} = 0$. Similarly, if the observer splits the total Stage 1-income equally, redistribution share is $\frac{(17.5-10)}{15} = 0.5$. Thus, the redistribution

[23] Observers do not receive an additional show-up fee.
[24] Please refer to *http://www.econ.ucsb.edu/~sevgi/Instructions_aay.pdf* for a copy of the instructions.
[25] A discussion of Stakeholder decisions is included in the Online Appendix.
[26] We define r, redistribution share, only for cases where Stage 1 earnings are not equal. Our analysis will focus on these cases.

share provides a normalized measure for the redistribution decisions: it is linearly increasing in the allocation to the low-income stakeholder; takes the value zero when there is no redistribution, and one half when there is an equal split (full-redistribution).[27]

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In cases where both stakeholders earned equal incomes, that is, when there was no inequality in Stage 1, 94% of all observers split the total pie equally between the two stakeholders.[28] Since there is little heterogeneity in redistribution decision for these situations, we only present data for three unequal income combinations: \$25-\$10, \$10-\$4 and \$25-\$4.

Figure 1 shows the histogram of redistribution shares for all observer decisions for three income combinations 25-10, 4-10 and 25-4. The most notable pattern of the histogram is that more than 65% of all decisions are either *no redistribution* or *equal split*. This combined share does not differ between treatments.[29] These two decisions represent two particularly distinct views towards the Stage 1 income combination: *No redistribution* represents unwillingness to intervene in determining final outcomes. On the other hand, *equal split* corresponds to maximal intervention as it amounts to complete elimination of inequality in earnings. While there can be other factors that affect willingness to "intervene", we believe there is a natural link between views on the fairness of Stage 1 income distribution and willingness to intervene in Stage 2. Importantly, our main results are based on treatment differences; thus, we are able to abstract away from other sources of variation and, we are able to identify how changes in the income generating process affect preferences for redistribution.

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[27] We did not restrict observers from reducing the earnings of the low-income subject, or from increasing it to values values above the final earnings of the high-income subject. Values of $r < 0$ correspond to cases where there is a net transfer from the low-income subject to the high-income subject. Values of $r > 0.5$ correspond to cases where, the low-income subject ends up with more than the high-income subject. Values of $r > 1$ correspond to cases where the high-income subject ends up with less than the initial earnings of the low-income subject.

[28] We interpret decisions of 6% of all observers as mistakes in this case, which is a reasonable share.

[29] We label $0.45 \leq r \leq 0.55$ as equal split and $-0.05 \leq r \leq 0.05$ as no redistribution. For no redistribution decisions this definition gives us the same results as when we restrict r to be exactly 0. For equal split, it also gives us the same results as when we restrict r to be exactly 0.5 when the total stakeholder income is an even number, but it makes a slight difference when the total stakeholder income was odd (i.e. when the income combinations were 25-10 and 25-4). We believe that some observers did not realize that they could redistribute fractions and redistributed 18 and 17 for the income combinations of 25-10 and 10-25.

Given that the majority of redistribution decisions can be categorized as *no redistribution* or *equal split* decisions which correspond to clearly distinct views on the fairness of Stage 1 earnings, we present the analysis focusing only on these decisions.[30],,[31]

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Figure 2 shows the fraction of *equal split* and *no redistribution* decisions in each treatment for each income combination. To test the effect of agency on fairness we first compare the Equality-Choice treatment and the No-Choice treatment. Next, we compare the Equality-Choice treatment and the Inequality-Choice treatment to test for the effect of procedural justice.

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3.1. Agency

In Figure 2, we observe that in the No-Choice treatment, the percentage of *equal split* is higher in all income combinations compared to the Equality-Choice treatment and the percentage of *no redistribution* is lower. This suggests that agency significantly influences fairness views of the observers. (All differences – except one- are statistically significant, as reported in Table 2.) We analyze the difference for each income combination in detail below.

25-10: This income combination was realized in the Equality-Choice treatment when two stakeholders made different choices: The high-income stakeholder chose the risky option and was lucky to earn \$25, whereas the low-income stakeholder chose the safe option and got \$10. In this case, not only is agency an integral feature of the income generating process, but it is also the source of the income inequality. In the No-Choice treatment, the two stakeholders were randomly assigned different numbers by the computer and earned \$25 and \$10 by pure luck.

Comparing the two treatments for this income combination tests the effect of agency when it is the source of inequality. In the Equality-Choice treatment, 50% of observer decisions are *no*

[30] To demonstrate that our results are not driven by changes in these regions, Table 2 in the Online Appendix replicates all our main results focusing on two other binary categorizations of redistribution decisions: (1) High $(0.25 \leq \text{r})$ and low $(\text{r} < 0.25)$; (2) Positive $(0.05 < \text{r})$ and negative $(\text{r} \leq 0.05)$. The cutoff for positive redistribution is $(0.05 < r)$ to be consistent with the definition of no redistribution $(-0.05 \leq r \leq 0.05)$ which is included under negative redistribution. Note that these two categorizations by construction include the entire data set.

[31] The Online Appendix also includes analysis of mean redistribution shares and analysis of distribution of gender and political views in our observer sample.

redistribution for this income combination, whereas the percentage of *no redistribution* is only 13% in the No-Choice treatment. Furthermore, the percentage of *equal split* decisions is only 6% in the Equality-Choice treatment, whereas it increases to 53% in the No-Choice treatment. The difference between the two treatments is significant for both variables (see Table 2 for regression results). The substantial difference in the percentage of each decision shows that agency strongly shifts fairness views on income inequality when it is the source of inequality.

4-10: In the No-Choice treatment, in this income combination, just as in 25-10, stakeholders only differed by the random assignment of earnings by the computer. In contrast, in the Equality-Choice treatment, 4-10 was realized when two stakeholders chose different options just as in 25-10. But in 4-10, the high-income stakeholder was the one who chose the safe option and got $10 and the low-income stakeholder was the one who chose the risky option, was unlucky and got $4. Thus, agency is still the source of income inequality, but the actions that lead to low versus high income are switched.

Figure 2 shows that redistributions decisions follow the same pattern in this situation as in the income combination 25-10. The percentage of *no redistribution* in 4-10 decreases substantially from the Equality-Choice treatment (56%) to the No-Choice treatment (13%). Additionally, the percentage of *equal split* increases substantially from the Equality-Choice treatment (21%) to the No-Choice treatment (69%). Both differences are significant at 1% level (see Table 2). Just as in 25-10, the significant difference in the fractions of *equal split* and *no redistribution* decisions in 4-10 confirm that agency has a significant influence on observers' fairness perceptions.

Gains vs. Losses: While in 25-10 redistributing to the low-income stakeholder means letting the two stakeholders share the *gains* from one stakeholder's risk-taking; in 4-10, redistributing to the low-income stakeholder means sharing the *losses* from one stakeholder's risky choice. Does it matter for fairness whether it is gains or losses from risk taking to be shared? Note that if there are observers who want to reward risk takers for choosing the option with the highest expected value, we might expect asymmetry in redistribution decisions between these two situations. We would expect such observers to redistribute losses more between the two Stakeholders relative to the gains.

Our experimental design allows us to address this question directly. Note that if we focus on redistribution decisions only in the Equality-Choice treatment, we see a higher percentage of equal split decision in 4-10 relative to 25-10 (visible in Figure 2, and verified statistically in Table 3). The asymmetry in these two situations, at first sight, suggests observers to be rewarding risk-takers.

However, the asymmetry could also be attributed to other factors. For example, observers might prefer higher redistribution in environments where total earnings are lower.[32] Thus, a true test of whether or not observers differentially treat risk-takers requires comparing redistribution decisions in the Equality-Choice to those in No-Choice where the outcomes are the same but the risk-taking phase is removed. If a similar type of asymmetry in redistribution decisions is also observed in the No-Choice treatment between 4-10 and 25-10, it would indicate that the difference cannot be attributed a preference by observers to reward risk-takers.

Such an exercise, as reported in the first two columns of Table 3 suggests that fairness perceptions of observers are not significantly influenced by whether or not the risk taker makes gains or loses. The interaction term with the Equality-Choice treatment and the income combination 4-10 is not significant for both dependent variables *equal split* and *no redistribution*.[33]

- - - - - - - - - - - Table 3 about here - - - - - - - - - - - -

25-4: In the Equality-Choice treatment, this income combination describes a situation that is different than the previous two we've looked at, because here both stakeholders chose the risky option and the difference in their Stage 1-income is entirely due to luck. In other words, agency is a feature of the income generating process but it is not the source of inequality. In the No-Choice treatment, just as with 25-10 and 4-10, stakeholders earned their income by luck. Comparing redistribution decisions between the Equality-Choice and No-Choice treatments presents us the strongest test of the effect of agency, because in the Equality-Choice treatment agency is not the source of income inequality but only a feature of the process.

Does the effect of agency on fairness views disappear in environments where agents made identical choices and inequality in earnings are due to external factors? Our results show that the effect of agency remains, but it is weakened. To examine whether observers distinguish between cases where inequality is due to factors under stakeholders' control (as in income combinations 25-10 and 4-10 where stakeholders made different choices) versus factors beyond stakeholders' control (as in 25-4 where stakeholders made identical choices), we report in the last two columns of Table 3,

[32] Note that our experimental design keeps the ratio of low earnings to high earnings constant in the gain and loss environments when a risk-taker meets a stakeholder who chose the safe option. (25/10 = 10/4)

[33] We are aware that because of the nonlinearity of the probit model, the estimates of the interaction effect (and their significance) need to be corrected. For sake of simplicity, we report the linear estimation results in Table XX and we note that the results do not change qualitatively when we correct for nonlinearity.

regression results where the interaction term of the Equality Choice treatment and equal choice (dummy for EC=1 and 25-4=1) is included. The interaction term is positive and significant for equal split decisions, indicating that the difference in the percentage of *equal split* between the Equality-Choice treatment and the No-Choice treatment is sensitive to whether the inequality in earnings are due to an external factor or not. While the same interaction term for *no redistribution* decisions is negative, it is not significant. Overall, the percentage of *no redistribution* is still significantly higher in the Equality-Choice treatment compared to the No-Choice treatment (Equality-Choice = 41%, No-Choice = 13%, $p < 0.01$) and the percentage of *equal split* is still lower in the Equality-Choice treatment (38%) compared to the No-Choice (53%) treatment, even though the difference is not statistically significant.

To summarize:

1. Whether or not agency is a feature of the income generating process alters observers' perception of the fairness of the income distribution: Observers redistribute significantly less when stakeholders have the ability to control their income.

2. Observers distinguish between cases where agency is the source of the observed inequality in outcomes (25-10 and 4-10) and cases where it is not (25-4). In the Equality-Choice treatment, when a lucky risk-taker meets an unlucky risk-taker (25-4), redistribution shares show a bimodal distribution with most decisions concentrated around *equal split* or *no redistribution*. A similar pattern is observed in Cappelen et al. (2013) (Figure 1D in their paper). Their results also show a drop in redistribution when risk-takers meet with subjects who choose the safe option (Figure 1E and 1F), which is paralleled in our results (Figure 2). Replication of these qualitative results are important as the two studies have been run with different implementation details in two countries, US and Norway, that greatly differ in terms of their redistribution attitudes and perception about the causes of inequality.

While Cappelen et al. (2013) employ only one income generating process in their design (which corresponds to the Equality-Choice treatment in our design) and compare redistribution decisions for the two different set of income combinations (same versus different choice), we can fully control for the initial income levels by comparing redistribution decisions for each income combination with and without agency, and we test for the interaction of treatment and the different income combinations (same choice versus different choice). Our results on whether or not observers

differentially treat risk-takers suggest that conclusions drawn from the data might be sensitive to this.

3.2. Procedural Justice

Next, we look at the effect of procedural justice by comparing the Equality-Choice treatment and the Inequality-Choice treatment. Figure 2 shows that for both income combinations, 25-10 and 4-10 (note that 25-4 cannot be observed in Inequality Choice), the percentage of *no redistribution* is lower in the Inequality-Choice treatment (but not as low as in the No-Choice treatment), and the percentage of *equal split* is higher (but not as high as in the No-Choice). The change in the percentage of both decisions suggests that when the income-generating process violates procedural justice, observers demand higher redistribution for the low-income stakeholder. Below, we examine each income combination separately:

25-10: This income combination was observed in both treatments when one of the stakeholders chose the risky option, was lucky and got $25 and the other stakeholder either chose or was assigned the safe option. The difference between the two treatments is precisely that in the Inequality-Choice treatment, the low-income stakeholder did not have the opportunity to choose between the two options.

In our sample, the percentage of *equal split* increased from 6% in the Equality-Choice treatment to 21% in the Inequality-Choice treatment, and the percentage of *no redistribution* decreased from 50% to 29%. Both differences are statistically significant. (see Table 2) Clearly, observers differentiate between an income generating process that satisfies procedural justice and one that violates it. The demand for redistribution is higher when procedural justice is violated, but not as high as when agency is fully absent. This can be seen when we compare redistribution decisions in this treatment to the No-Choice treatment. This reinforces the importance of agency in determining views on fairness. Even in environments where procedural justice is violated, at least in the eyes of some observers, the high-income stakeholder can be entitled to his income if he made a deliberate choice of taking risk.

4-10: In this income combination, the low-income stakeholder is the one who chose the risky option and was unlucky and the high-income stakeholder is the one who chose or was assigned the safe option. The critical difference between the two treatments is that in the Inequality-Choice treatment, the high-income stakeholder did not have the opportunity to choose the risky option.

When we compare the Equality Choice treatment to the Inequality Choice treatment, we see that the percentage of *equal split* increases from 21% to 32%, although the difference is not significant, and the percentage of *no redistribution* decreases from 56% to 32% (this difference is significant at the 10% level). In summary, we see that the percentage of no redistribution and equal split change in the same direction as in the previous income combination, however it is smaller in size.

This income combination, however, proves to be a tricky setting to explore the effect of procedural justice. In general, if procedural justice has an effect on fairness views, we would expect the demand for redistribution to increase in the Inequality-Choice treatment. However, for this income combination, this might not be the case as there is a potential counteracting force. The fact that the high-income stakeholder was the one with less opportunity allows for two different interpretations of procedural justice. If observers only care about violation of procedural justice and not take into consideration outcomes in Stage 1, they would redistribute more to the low-income stakeholder in the Inequality-Choice treatment, regardless of the identity of the low-income earner. On the other hand, if observers also take into consideration the particular outcome in Stage 1, their redistribution decision could depend on whether or not the low-income earner is also the one with limited opportunities to begin with. This line of reasoning might lead observers to redistribute less to the low-income stakeholder in the 10-4 income combination relative to the 25-10 combination. This would be consistent with observers using ex-post redistribution to compensate for ex-ante inequality in opportunity. Hence, we take the previous income combination (25-10) as the preferred test of the effect of procedural justice.

Overall, our data suggests that observers differentiate between the two processes, one satisfying and the other violating procedural justice. We find higher redistribution in the Inequality Choice treatment. However, the share of *equal split* and *no redistribution* decisions are also most similar in this treatment highlighting significant disagreement in the subject pool in terms of how environments with partial agency, but violation of procedural justice should be addressed.

- - - - - - - - - - - Figure 3 about here - - - - - - - - - - - -

3.3. Consistency of observer decisions

In this section, we examine the extent to which an observer's redistribution decisions for different income combinations were consistent with certain decision rules, by analyzing within-

subject decisions. To answer this question, we first look at the correlations when redistribution share is between no redistribution and equal split.[34]

With this analysis, we see that there is a very significant and positive correlation between all income combination couples in all treatments, except for between 25-10 and 25-4 and between 4-10 and 25-4 in the Equality-Choice treatment. This is in line with our results in the previous sections, showing that in the Equality-Choice and Inequality-Choice treatments observers do not differentiate between the income combinations 25-10 and 4-10 in which stakeholders made different choices. These results also show that in the Equality-Choice treatment, observers differentiate between 25-4 in which two stakeholders chose the same option and the other two income combinations in which stakeholders chose different options. Moreover, the correlations are the strongest in the No-Choice treatment, suggesting that when both stakeholders earn their income by luck, observers do not differentiate between the initial levels of incomes.[35]

To gain a better understanding of how redistribution decisions across different income combinations are consistent with a potential set of decision rules, we classify observers into types using a very simple categorization. We divide the range between *no redistribution* and *equal split* into two and call any redistribution decision where $-0.05 \leq r < 0.25$ a low redistribution decision. Correspondingly, $0.25 \leq r \leq 0.55$ is identified to be a high redistribution decision. Types are determined as follows: An observer who always chooses high redistribution is a high redistributor; an observer who always chooses low redistribution is a low redistributor. In addition to these types, applicable only for the Equality-Choice treatment, we define a new type, who chooses high redistribution only when both stakeholders are risk-takers (corresponding to the 25-4 income

[34] For this analysis, we look at all subjects but drop the observations that are not between no redistribution and equal split. Only 16% of redistribution decisions are extreme in our sample. Table 3 in the Online Appendix shows the Pearson's correlation coefficient between redistribution decisions for each income combination in each treatment separately for non-extreme decisions.

[35] On the other hand, when we look at the correlations across extreme decisions for the cases where redistribution share is less than zero or more than one half, we see a different pattern (Reported in Table 4 of the Online Appendix). No observer in the Equality-Choice treatment made extreme decisions for all income combinations, but 5 observers made extreme decisions in both 25-10 and 4-10. For these observers, redistribution share in 25-10 and 4-10 is strongly and negatively correlated. This can be explained by observers differentiating between risk-takers and non-risk-takers when making extreme redistribution decisions. For example, awarding the risk taker would imply low redistribution in 25-10 and high redistribution in 4-10 giving us negative correlation between the two decisions. Correlation results for the other treatments are not significant. It should be noted however that there are very few extreme decisions in these treatments. In the Inequality-Choice treatment, 5 observers made extreme decisions for both income combinations and their decisions are also negatively correlated, though not significant. 3 of these always favored low opportunity stakeholder and 2 of these always favored the high-income stakeholder. In the No-Choice treatment, 2 observers made extreme decisions in all income combinations and both of them always swapped the income of the low and high-income stakeholders.

combination), but otherwise chooses low redistribution. These types are labeled as conditional low redistributors. Table 4 reports share of observer types in each treatment.

- - - - - - - - - - - Table 4 about here - - - - - - - - - - - -

A few observations stand out. First, we see that a large majority of observers can be classified under one of these types, which shows that observer redistribution decisions are for the most part internally consistent. Second, we find the highest share of low-redistribution types in the Equality-Choice treatment (42%). Moreover, in this treatment, another 29% of observers are conditional low redistributors. Correspondingly, the highest share of high-redistribution types is in the No-Choice treatment (81%). Finally, we see that the low and high redistribution types describe a majority (80%) of the observers in the Inequality-Choice treatment. This suggests that the heterogeneity observed on the aggregate level in redistribution decisions in this treatment is not mainly due to heterogeneity in decisions of individual observers. Most subjects act in an internally consistent manner. There is heterogeneity across subjects. While some always choose high redistribution, some always choose low-redistribution.

4. Discussion

Our results reveal an interesting pattern about how procedural justice and agency shape our preferences for redistribution. In a treatment where both procedural justice and agency are present we observed almost no redistribution. In contrast, in a treatment where there is procedural justice but no agency, the majority of the subjects chose to redistribute fully. In the third treatment where there is partial agency (enjoyed by only one agent) and inequality of opportunity, subjects were more heterogeneous in their responses. In this case, a third of the subjects chose not to redistribute at all. At the same time, another third of subjects showed opposing preferences: they chose to redistribute fully.[36]

Our results speak to how agency impacts fairness views in the context of risk: inequality resulting from risk is treated differently if risk is chosen voluntarily vs. if it is exogenously imposed. Second, our results highlight the importance of equality of opportunity in environments where there

[36] The remaining decisions mostly correspond to partial redistribution.

is some agency. On a general level, this suggests that public opinion on redistributive programs would tend to reflect beliefs about how much agency individuals have over their circumstances and the degree to which different groups face equal opportunities.

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TABLES

TABLE 1

SUMMARY OF EXPERIMENTAL MANIPULATIONS

Treatments	Agency	Procedural Justice
Equality Choice	x	x
No Choice	-	x
Inequality Choice	x (partial)	-

TABLE 2

PERCENTAGE OF NO REDISTRIBUTION AND EQUAL SPLIT DECISIONS IN EACH TREATMENT

Variable	Income Combination	Equality Choice	Inequality Choice	No Choice	Equality Choice vs No Choice	Equality Choice vs Inequality Choice	Inequality Choice vs No Choice
No Redistribution	25-10	50%	29%	13%	$p < 0.01$	$p = 0.08$	$p = 0.09$
	4-10	56%	32%	13%	$p < 0.00$	$p = 0.05$	$p = 0.06$
	25-4	41%		13%	$p < 0.01$	-	-
Equal Splits	25-10	6%	21%	53%	$p < 0.00$	$p = 0.08$	$p < 0.01$
	4-10	21%	32%	69%	$p < 0.00$	$p > 0.1$	$p < 0.01$
	25-4	38%		53%	$p > 0.1$		

^ Only for observer decisions.
^^ All tests are based on Probit regressions.

TABLE 3

PROBIT REGRESSION RESULTS

Dependent variable	Equal Split=0/1	No Redistribution= 0/1	Equal Split=0/1	No Redistribution= 0/1	Equal Split=0/1	No Redistributi on= 0/1	Equal Split=0/1	No Redistributi on= 0/1
Income combinations included	25-10 and 4-10	25-10 and 4-10	all three	all three	25-10 and 4-10	25-10 and 4-10	all three	all three
Control Variables included	No	No	No	No	Yes	Yes	Yes	Yes
dummy (EC = 1)	-10.8***	4.85***	-2.82***	2.36***	-9.90***	4.68***	-2.80***	2.27***
	(2.9)	(1.65)	(0.76)	(0.67)	(2.9)	(1.55)	(0.75)	(0.66)
dummy (4-10 = 1)	2.49**	-0.0003			2.33**	-0.0006		
	(1.1)	(0.79)			(1.1)	(0.79)		
dummy (EC = 1 & 4-10 =1)	2.28	0.61			2.10	0.62		
	(2.4)	(0.99)			(2.24)	(0.99)		
dummy (25-4 = 1)			-0.51	0.0002			-0.51	0.006
			(0.43)	(0.53)			(0.43)	(0.52)
dummy (EC = 1 & 25-4 =1)			2.00***	-0.5			2.01***	-0.5
			(0.63)	(0.43)			(0.63)	(0.62)
constant	1.35	-4.68***	0.68	-2.2***	0.85	-4.4**	0.52	-2.53***
	(0.98)	(0.82)	(0.46)	(0.56)	(2.12)	(1.92)	(0.96)	(0.96)
N	132	132	198	198	132	132	198	198

*** p <0.01, ** p <0.05. Standard errors in parantheses. Errors are clustered at subject level.

This analysis involves only observer decisions, and EC and NC treatments.

Control Variables are (1) a dummy for female and (1) a categorical variable for political views with three values: Democrat, Republican, Not Available.

TABLE 4

DISTRIBUTION OF OBSERVER TYPES

	Low Redistributior	High Redistributior	Conditional Low Redistributior	Unidentified	Share Included
Equality Choice	42%	13%	29%	17%	71%
Inequality Choice	32%	48%	0%	20%	74%
No Choice	12%	81%	0%	8%	81%

Notes:

^ Low Redistributor chooses $-0.05 \leq r < 0.25$ for all income combinations.

High Redistributor chooses $0.25 \leq r \leq 0.55$ for all income combinations.

Conditional Low Redistributor chooses $0.25 \leq r \leq 0.55$ when both agents choose the risky option.

otherwise chooses $-0.05 \leq r < 0.25$.

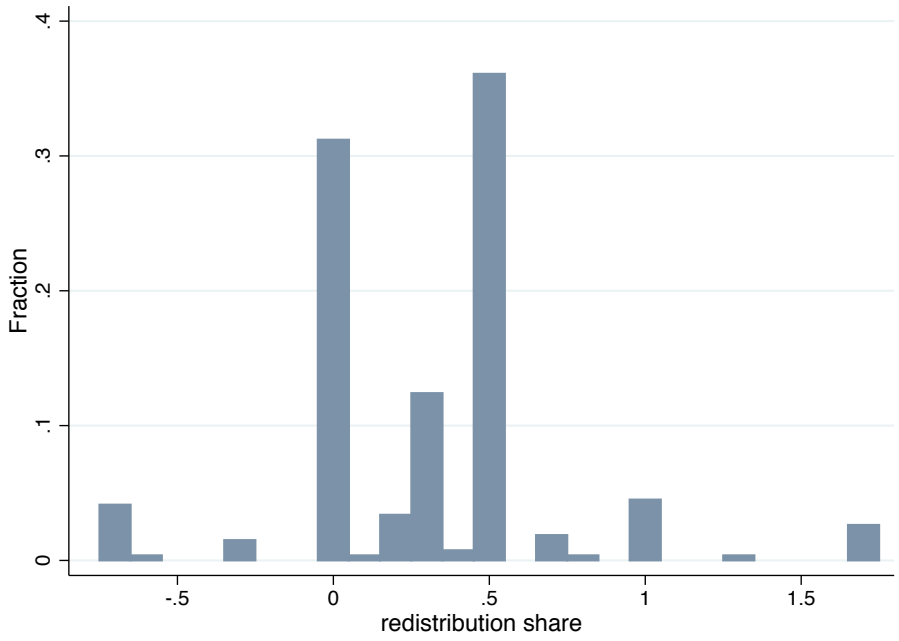
Share Included is the share of subjects who have never chosen an extreme redistribution decision:

$r < -0.05$ or $r > 0.55$.

FIGURES

FIGURE 1

Histogram Of Redistribution Share



^ N = 262.
^ Data includes all observer decisions in all treatments and all income combinations.

FIGURE 2

Fraction Of "Equal Split" And "No Redistribution" Decisions In Each Treatment For Each Income Combination

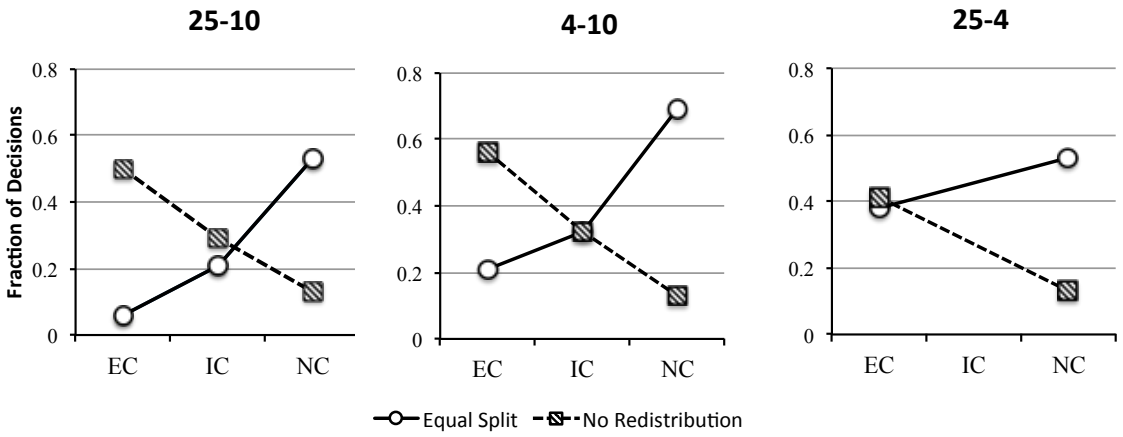
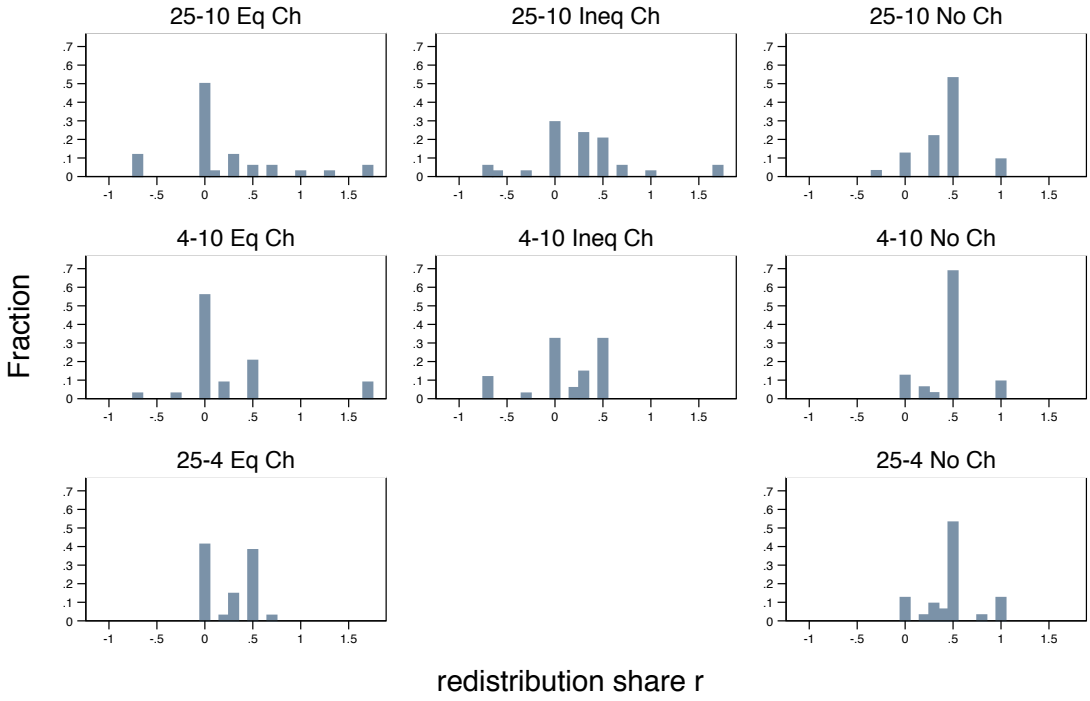


FIGURE 3

Histograms Of Redistribution Share For Each Income Combination In Each Treatment



^ In the choice treatments, 25-10 is the income combination in which one of the stakeholders is the lucky risk-taker and the other is safe. 4-10 is the income combination in which one of the stakeholders is the unlucky risk-taker and the other is safe. In 25-4, both stakeholders are risk-takers. Given the design, decisions on the same column belong to the same observers, and decisions in different columns belong to different observers.