Just Luck: An Experimental Study of Risk Taking and Fairness

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Abstract

What is the fair distribution of gains and losses from risk taking? The answer to this question has wide-ranging implications for economic policy. This paper studies people's fairness preferences in risky situations. It reports the results from a two stage dictator game where the distribution phase was preceded by a risk-taking phase in which individuals made decisions about whether to take risky gambles which affected their earnings. The design allows us to study whether or not inequalities between those who take risk and those who chose a safe alternative are viewed as fair and whether or not inequalities between lucky and unlucky risk-takers are viewed as fair. We study the distributive choices of both stakeholders, whose own payoffs are affected in the distribution, and impartial spectators, who distribute as third parties. Using the estimates of a structural choice model, we find that most people view inequalities between those who take risk and those who do not as fair, but see inequalities between lucky and unlucky risk takers as unfair. We also find that the estimates of the prevalence of different fairness ideals among spectators are almost identical to the prevalence that can be inferred from the choices of stakeholders.

1 Introduction

As recent events in the US and world financial markets have made abundantly clear, choices involving risk can have large and widespread consequences for the

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economic fortunes of both risk-takers and those who seek to avoid risk. The public debates surrounding the various bailout plans and the outcries against compensation to those seen as having caused the current economic crisis have been marked by frequent and passionate references to fairness. Parties whose economic interests conflict often appeal to fairness arguments, but there is probably no more contentious question of justice than whether and how to allocate the gains and losses that inevitably result from risky choices. Such questions permeate consideration of government bailouts of distressed industries, windfall profit taxes, agricultural supports, income taxation, welfare programs, and indeed all policies that significantly affect the distribution of income and wealth.

This paper reports the results of an economics experiment designed to examine fairness preferences over the distribution of gains and losses associated with risk-taking. Various recent experimental and theoretical studies have examined possible trade-offs between the desire to achieve a fair distribution and the desire to avoid risk (Babicky 2003; Babicky and Ortmann 2005; Brennan, González, Güth, and Levati 2008; Krawczyk and Le Lec 2008). We believe ours is the first paper, however, to study what people view as the fair distribution of gains and losses from risk-taking. The work of Zizzo (**??**), including a paper with Oswald (Zizzo2001), comes closest to our study. In a series of interesting experiments, subjects first choose how much to invest in a risky gamble, earnings are distributed and then subjects can (and often do) destroy the earnings of other participants. Our study differs in several respects, but most importantly we place no restrictions on how the participants choose to distribute the money in the distribution phase and this allows us to focus on the fairness preferences of individuals rather than on envy.

In addition, this is the first study to examine whether such fairness preferences differ between stakeholders, whose own payoffs are affected in the distribution, and impartial spectators, who distribute as third parties. The fairness preferences of the former are important to distributive analysis of the behavior of individual workers, labor unions, managers, and regulators. One might view the preferences of the latter, on the other hand, as relevant for informing normative theories and economic policies. Moreover, the side-by-side comparison of the two groups provides important methodological implications for empirical social preference research, which has previously estimated fairness ideals using only stakeholders (Cappelen, Hole, Sørensen, and Tungodden 2007b; **?**) or spectators (Konow 2000).

In order to study how people view inequalities that arise from risk-taking, we conducted a dictator game with two stages: a risk-taking phase is followed by a distribution phase. In the risk-taking phase, participants face a series of situations in which they choose between a risky and a safe alternative. The only difference between the situations was the value of the safe alternative. All individuals faced the same choice alternatives, which ensured that no inequalities in earnings were due to differences in opportunities.

In the distribution phase, those who made choices in the risk-taking phase were matched anonymously with a sequence of other individuals who faced the same situations, but who might have made different choices and who might have been lucky or unlucky in the risky alternative. They were then asked to distribute the total earnings between themselves and the other individual in the pair. This design allowed us to study distributive decisions where inequalities emerged both due to differences in choices and differences in luck. Moreover, the subjects received full information about all participants' contributions to the total earnings, their choices and their luck. This ensured that differences in distributive behavior were not due to differences in beliefs about the source of inequality (Alesina and Angeletos 2005). By varying the attractiveness of the safe alternative, we could also study whether the willingness to redistribute between lucky and unlucky risk-takers depended on the cost of avoiding risk.

Subjects were randomly assigned to the role of either stakeholder or spectator and remained in that role throughout the experiment. The spectators did not make choices in the risk-taking phase. Instead, they were randomly presented with a sequence of distributive situations faced by the stakeholders and asked to determine how the total earnings of the two stakeholders should be distributed between them.

Using the estimates of a structural choice model, the analysis provides five main findings. First, we find that most participants view inequalities between lucky and unlucky risk-takers as unfair. Second, the prevalence of this view was independent of the value of the safe alternative. Third, we find that most participants view inequalities between those who take risk and those who choose the safe alternative as fair. Fourth, we find that views on the fair allocation of gains and losses from risk-taking are related to political orientation and to general beliefs about whether luck or hard work is more important for life outcomes, but that these views are unrelated to gender. Finally, we find that the estimates of the prevalence of different fairness ideals based on the choices made by stakeholders give almost exactly the same results as the estimates based on the choices made by the spectators. This result suggests that stakeholders and spectators are motivated by the same fairness ideals and it diminishes concerns that stakeholder decisions might be qualitatively biased due to self-interest or that spectator choices are insufficiently incentivized.

The paper is organized as follows. Section 2 presents a theoretical framework for our treatment of fairness and risk. Section 3 presents the experimental design, and section 4 reports the descriptive statistics and data analysis. Section 5 contains a structural model of individual decision making and compares the decisions of stakeholders and impartial spectators and section 6 concludes.

2 Fairness and risk-taking

A controversial question in the contemporary literature on distributive justice (Dworkin 1981a,b; Lippert-Rasmussen 2001; Vallentyne 2002) has been whether individuals should be viewed as responsible for their choices to take risk and for their luck. The answer to this question has implications for how gains and losses from risk-taking should be distributed. In the situations we consider in this paper, where earnings only are affected by choice and luck, we distinguish three views that are informed by major theoretical and philosophical schools of thought. The first view is outcome egalitarianism (OE), which can be formulated as follows:

Outcome Egalitarianism individuals should not be held responsible for their choices or for their luck.

The implication of this view is that all income inequalities should be eliminated, independent of whether they result from differences in choice or from differences in luck. One possible defense of outcome egalitarianism is that differences in risk-taking primarily are a result of factors outside individual control, for example one's innate disposition, upbringing or other morally irrelevant factors.

Most contemporary egalitarians would, however, argue that risk-taking is, at least to some extent, under individual control and that outcome egalitarianism, therefore, equalizes too much.

The second view, at the opposite extreme, is that any inequalities resulting from risk-taking in a situation of equal opportunity should be accepted. This view has been advocated by Ronald Dworkin (Dworkin 1981a,b) and Richard Arneson (Arneson 1989) and is often referred to as luck egalitarianism (LE). This view about the fair distribution of income can stated as follows:

Luck Egalitarianism individuals should be held responsible for their choices and for their luck.

The implication of this view is that risk-takers should be held responsible for the actual outcome of any risks they choose to take as long as everyone has the same opportunities to take risks. There should, therefore, be no redistribution between risk-takers and those who do not take any risks, and there should be no redistribution between lucky and unlucky risk-takers. In the current study, therefore, this view represents the libertarian position.

The third view is what we shall refer to as choice egalitarianism (CE). This approach has been advocated by Marc Fleurbaey (**?**) and Lippert-Rasmussen (2001). In this context, it can be seen as an intermediate position to outcome egalitarianism and luck egalitarianism.

Choice Egalitarianism individuals should be held responsible for their choices, but not for their luck.

Choice egalitarianism implies that inequalities between individuals who take the same risk should be eliminated but that income inequalities between risk-takers and those who do not take risk should be preserved, as long as everyone had the same opportunities.

An argument against all three of these positions is that they do not take into account the cost of avoiding risk. In our context, the cost of avoiding risk is the difference between the expected value of the risky choice and the value of the safe alternative. One position is that the responsibility for risk-taking depends on the cost of avoiding risk. For example, perhaps people should not be held responsible for their choice to take risk when the cost of avoiding the risk is very high, but that they should be held responsible if they choose to take a risk when the value of the safe alternative is equal to the expected value of the risky alternative [1]. A natural generalization of this line of thinking is that the degree of redistribution between lucky and unlucky risk-takers should be increasing in the cost of avoiding the risk.

3 Design and procedures

We recruited participants among students at the Norwegian School of Economics and Business Administration (NHH) in Bergen, Norway. A total of 119 subjects participated in the four sessions that lasted about 40 minutes and that all took place on the same day. Including a 100 NOK show up fee, subjects earned, on average, 472 Norwegian Kroner (NOK) or about 75 USD. The experiment was conducted in a computer lab using web-based interface and was double blind, i.e., neither subjects nor experimenters could associate decisions with particular subjects. Moreover, earnings were paid anonymously by wire using payment codes through an independent accounting division, a fact that was communicated to all subjects.

At the beginning of the experiment, the participants were randomly assigned to be either a type I participant or a type II participant. We shall refer to type I participants as stakeholders and type II participants as spectators. There were 78 stakeholders and 41 spectators.

There were two decision-making phases in the experiment: a risk-taking phase and a distribution phase. In the risk-taking phase, stakeholders, but not spectators, were asked to choose between an alternative with a certain value and an alternative with a risky outcome in four different situations. In all four situations the risky alternative had an equal chance of generating 800 NOK or 0 NOK, i.e., the expected value of the risky alternative was always 400 NOK. The safe alternative varied across the four situations and took on the values 400 NOK, 300 NOK, 200 NOK or 25 NOK. The four situations were presented in random

[1] See Lippert-Rasmussen (2001) for a discussion of this question

order. Subjects were informed that the outcome of the risky alternative, should they choose it, would be determined randomly by the computer.

In the distribution phase, stakeholders were anonymously and randomly paired with a sequence of eight other stakeholders. For each pair one of the four situations from the risk-taking phase was randomly drawn and each stakeholder was asked to determine how the total earnings of the two stakeholders should be distributed among them. Before they made their choice the subjects were informed about the alternatives they faced in this situations, what alternative each member of the pair had chosen, and the outcome of the risky alternative, if applicable. Thus, there was no uncertainty about the source of inequality in earnings. The pairs were presented in random order, and after making their decisions, subjects were given a final opportunity to revise, if desired. The participants received no information about the other participants' distribution choices before the distribution phase was completed.

The spectators were similarly asked to make eight distribution choices. For each choice, the spectators were randomly presented with one of the distributive situations faced by a stakeholder pair and asked to determine how the total earnings should be distributed between the pair of stakeholders. The spectators were provided with the same information as the stakeholders.

For each distributive situation, at most three proposals were made, one by each of the two stakeholders and one by a spectator. At the start of the experiment, participants were told that when the distribution phase was finished, the computer would randomly selected for each of the stakeholders one of the situations and one of the proposals for the calculation of actual payments. Spectators received a fixed payment unrelated to their decisions, the amount of which was indicated to them privately on their screens to be NOK 350 (in addition to their show up fee).

4 Descriptive statistics and basic analysis

As a background for the analysis, we present some descriptive statistics from the risk-taking phase and the distribution phase.

4.1 Results from the risk-taking phase

Table 1 provides an overview of the choices made by the 78 stakeholders in the risk-taking phase. We observe that only 7 participants express risk loving preferences by choosing the risky alternative when the two alternatives have the same expected value. One-third of the participants express risk averse preferences, by choosing the safe alternative when it has a lower expected value than the risky alternative, although no one is so risk averse as to choose the safe alternative when it has a value of 25. Considering the complete set of choices of each stakeholder, we observe that the preferences of all but five obey monotonicity, i.e., a subject who chooses the risky alternative for a high value of the safe alternative also does so for lower values of the safe alternative.

[Table 1 about here.]

4.2 Results from the distribution phase

From Table 2 we observe that most distributive situations in the data are situations where both stakeholders choose the risky alternative, but we also have 112 distributive situations where one stakeholder chooses the risky alternative and the other stakeholder chooses the safe alternative and we have 152 distributive situations where both stakeholders choose the safe alternative.

[Table 2 about here.]

Table 3 provides an overview of the distributive choices of both stakeholders and spectators. On average, the stakeholders give 23.5 percent to the other participant, significantly less than an equal split and in line with what is observed other dictator games. In 191 out of the 530 situations involving positive earnings that are allocated by a stakeholder, stakeholders give nothing to the other participants, but there are also 32 situations where stakeholders give away more than 50 percent and even 9 situations where stakeholders give away the entire earnings.

[Table 3 about here.]

The spectators divide the income equally among the two stakeholders in more than one half of the situations. It is interesting, however, to note that, in 126 out of 283 situations involving spectator allocations of positive earnings, the spectator chooses an unequal distribution, and there are even 59 situations where spectators give the entire earnings to just one of the stakeholders. Table 4 reports the mean allocation decisions for both spectators and stakeholders conditional on the outcome from the relevant choice in the risk-taking phase. The rows indicate the outcomes for the first stakeholder and the columns the outcomes for the second stakeholders. For stakeholder decisions, the first stakeholder is the dictator and the second stakeholder the recipient. For spectator decisions, this distinction is not relevant and the entries represent the fraction of earnings given to the second stakeholder. We observe that there is considerable variation in the share given across combinations of outcomes. For the stakeholders, the share given to the opponent is high when an unlucky dictator is paired with a recipient who is a lucky stakeholder or has chosen the safe alternative and when a dictator who has chosen a safe alternative is paired with a lucky risk-taker. In contrast, the share given to the opponent is low when the dictator is a lucky risk-taker and is paired with a recipient who either has chosen the safe alternative or is an unlucky risk-taker. The share is also low when a dictator who has chosen the safe alternative is paired with an unlucky risk-taker.

The spectators have no stake in the distributive situations, and thus we expect their choices mainly to be motivated by fairness considerations. It is therefore not surprising that the spectators give more to the second stakeholders, on average, for every possible outcome pair than do stakeholders. We observe, however, that the pattern of giving is similar to that of stakeholders.

[Table 4 about here.]

By studying the average shares given by the spectators in Table 4 we can get an indication of what fairness ideals that motivate the participants. First, we observe that all spectators are not outcome egalitarians. If that were the case, spectators would choose equal splits in all situations, but there are significant deviations from equal splits for many outcome combinations. This suggests that there must be some choice egalitarians or luck egalitarians. Second, all spectators are not luck egalitarians. If they were, they would give both stakeholders their outcomes, e.g., lucky stakeholders would get all of the earnings when paired with unlucky ones. From Table 4, however, we observe that this is not the case.

Finally, we can also rule out the possibility that all spectators are choice egalitarians. If this were the case, they would equalize total earnings between lucky and unlucky stakeholders. Inspecting Table 4, however, it is clear that this is not the case.

Thus we can reject the hypothesis that a single rule suffices to capture the fairness views of spectators. Table 4 is, however, consistent with pluralism of fairness ideals among the participants. The presence of outcome egalitarians can, for example, explain why, on average, the unlucky risk-taker receives something at all when paired with a lucky risk-taker, and the presence of choice and luck egalitarians can explain why, on average, this share is less than 50 percent. Moreover, such pluralism of fairness ideals is also consistent with there being close to an equal split when both participants have chosen the safe alternative and when both participants are lucky risk-takers, since all three fairness ideals imply equal splits in these situations.

From Table 4, it is interesting to observe that even though the fraction offered by stakeholders is less than that given by spectators, the pattern of choices is quite similar for stakeholders and spectators. This serves as an indication that the fairness perceptions of stakeholders and spectators are similar, and hence that the main difference between the two groups is that the stakeholders are motivated by self-interest.

The descriptive statistics allow us to study whether the value of the safe alternative plays a role for the spectators' perception of fairness. When the value of the safe alternative is low, for example 25, one might argue that the cost of avoiding the risky alternative was so high that the stakeholders are more or less forced to choose the risky alternative. As a consequence, spectators might not view it as fair to hold stakeholders responsible for their choice in such situations. At the same time, spectators might view it as fair to hold stakeholders responsible for their risk-taking behavior when the value of the safe alternative is close to or equal to the expected value of the risky alternative. If this is a prominent view among the spectators, then we should observe that the share given to unlucky (lucky) risk-takers when meeting lucky (unlucky) risk-takers is decreasing (increasing) in the value of the safe alternative. As we can see from Table 5, however, no such pattern exists. The share given to the lucky risk-takers is almost the same for all values of the safe alternative. From this we conclude that the value of the safe alternative does not affect the view of spectators about what constitutes a fair distribution.

[Table 5 about here.]

5 A model of distributive choices

In this section we introduce a structural model that enables us to study further the prevalence of different fairness ideals and the role of self-interest.

We assume that a stakeholder i is motivated by fairness considerations and by personal income when considering how to distribute the total income X generated in the risk-taking phase. Spectators are assume to be motivated only by fairness considerations. More specifically, we assume that person i is maximizing the following utility function when making distributive choices:

$$V_i^{k(i)}(y_i; \cdot) = \delta_i \gamma y_i - \beta_i (y_i - F^{k(i)})^2 / 2X, \tag{1}$$

where $F^{k(i)}$ denotes what dictator i considers the fair income to the first stakeholder (himself, when the dictator is a stakeholder). Similarly, y_i denotes what dictator i allocates to the first stakeholder. If the dictator is a stakeholder, $\delta_i = 1$ and activates a weight γ on monetary self interest and if the dictator is a spectator, $\delta_i = 0$. The weight individual i attaches to fairness considerations is given by β_i. People might differ both in the weight they attach to fairness considerations and in what they consider to be a fair distribution. For an interior solution, the optimal proposal, y_i^*, is

$$y_i^* = F^{k(i)} + \delta_i \gamma X / \beta_i. \tag{2}$$

We assume that the individuals endorse either an outcome egalitarian (OE), choice egalitarian (CE) or luck egalitarian (LE) fairness view. In this experiment these views can be written as

$$F_i^{OE} = \frac{1}{2}X, \tag{3}$$

$$F_i^{LE} = x_i, \tag{4}$$

$$F_i^{CE} = \begin{cases} \frac{1}{2}X & \text{if } C_i = C_j, \\ x_i & \text{if } C_i \neq C_j \end{cases} \tag{5}$$

where x_i is individual i's earnings and C_i takes the value 1 if the individual choose the risky alternative and the value 0 otherwise.

Since the value of the safe alternative did not significantly influence how much the participants on average gave in the different types of situations, we assume that an individual has the same fairness view across situations.

5.1 Estimates of the model

We assume a discrete choice random utility model of the form

$$U_i(y; \cdot) = V_i^{k(i)}(y; \cdot) + \epsilon_{yi}, \quad \text{for } y = 0, 25, \ldots, X, \tag{6}$$

where the ϵ_{yi} are assumed to be iid extreme value. For each individual, with an fixed (k, β), the choice probabilities then have a simple logit form. As in Cappelen et al. (2007b), we make the assumption the β_i has a log normal distribution, such that $\log \beta \sim N(\zeta, \sigma^2)$.

If we collect all parameters estimated in the vector $\boldsymbol{\theta}$, we can write the likelihood contribution of an individual conditional on a fairness view k as

$$L_i^k(\boldsymbol{\theta}) = \int_0^\infty \left(\prod_{j=1}^{J_i} \frac{e^{V^k(y_{ij};,\beta,\cdot)}}{\sum_{s \in \mathcal{Y}_{ij}} e^{V^k(s;\beta,\cdot)}} \right) dF(\beta; \zeta, \sigma). \tag{7}$$

The index $j = 1, \ldots, J_i$ indicates the number of choices made by individual i and $\mathcal{Y}_{ij}$ is the choice set $\{0, \ldots, X\}$ for individual i in situation j. For the total likelihood contribution of an individual, we must weight with the population shares of individuals,

$$L_i(\boldsymbol{\theta}) = \sum_k \lambda^k L_i^k(\boldsymbol{\theta}). \tag{8}$$

Table 6 reports estimates for different specifications of the model. The population share for each of the fairness ideals is the estimated proportion of the participants motivated by this particular fairness ideal.

[Table 6 about here.]

In specification (1) of Table 6, we report our preferred estimates, where stakeholders and spectators are allowed to have different distributions of β, but are restricted to have the same population shares of people holding the different ideals outlined in equations (3), (4) and (5). In specification (2), we loosen the restriction that the population shares are the same among stakeholders and spectators. As is evident from the estimates of λ^{OE}, λ^{LE} and λ^{CE}, this restriction is not very binding. Consequently, the likelihood also barely changes. Hence, we conclude that we can rely on a simpler model where the proportion of people holding the different ideals is not influenced by whether they are stakeholders or spectators.

Given the small changes in likelihood as we loosen the restriction that the population shares are the same (from specification 1 to 2), one might suspect that the shares holding different ideals are much less important for explaining the data than the estimated standard errors indicate. In order to check this, we dropped one of the fairness ideals in turn, to see whether this would make a difference to the model fit (specifications 3, 4 and 5). As is evident from the likelihoods, these specifications fit the data much worse than the full model, and we conclude that all of the ideals are of importance in order to explain the data.[2]

Using our preferred estimates, we observe that the luck egalitarian position is the most prevalent fairness ideal with a share of 42 percent, while the outcome egalitarian and the choice egalitarian ideals are approximately equally prevalent at about 29 each. Given these estimates, we conclude that a majority of the participants (71 percent) believe it is fair that individuals should be held responsible for their choices and that, therefore, no redistribution should take place between those who make different choices. This implies that a majority thinks it fair that the risk-takers earn, on average, more than those who do not risk when there is an expected gain from risk-taking. We also see that a majority (58 percent) view inequalities between lucky and unlucky risk-takers as unfair and believe that the unlucky risk-takers should be compensated.

5.2 How well does the estimated model fit the data?

In order to get a notion of how well the estimated model in our preferred specification from Table 6 (specification (1)) fit the data, we used the estimated parameters and the situations in the dataset to create artificial datasets.

Our estimated model fits the *level* of giving across all situations well. The average share given to the second stakeholder is simulated to be 0.246 for stakeholders and 0.506 for the spectators, numbers that should be compared to the averages of the actual data of 0.235 and 0.507.

To get a notion of how well our model is able to fit the *pattern* of giving in the data, we provide Table 7, a replica of Table 4 where for ease of comparison, we

[2]Note that since the hypothesis that one of the λ^k is zero is on the boundary of the parameter space, standard likelihood ratio tests do not apply (Andrews 2001).

have chosen to scale both the actual data and the simulated data by the average share given by stakeholders and spectators respectively. A number below (above) unity thus means that the average share given to the second stakeholder for this outcome combination is below (above) the average share given for all situations. We conclude that the model is fairly close to replicating the main patterns for both stakeholders and spectators.

[Table 7 about here.]

5.3 Post-distribution inequality

Our estimates allow us to study how the post-distribution inequality depends on the prevalence of the different fairness views and the source of pre-distribution inequality. Table 8 reports the estimated post-distribution inequality, measured as the average pair-wise Gini, under different assumptions about the prevalence of fairness views and the source of inequality in the outcomes from the risk-taking phase. Panel A reports the results for when only spectators make the distributive decisions, and Panel B when only stakeholders make the distribution decisions. Thus, Panel A reflects what the participants view as fair inequality, whereas Panel B also reflects how the distribution decisions by stakeholders is affected by a trade-off between fairness considerations and self-interest.

The first column provides the predicted average pair-wise Gini for the post-distribution income given the actual source of pre-distribution inequality. The second and third columns provide the same estimates under the assumption that the inequality in pre-distribution income is a result only of differences in choice or only of differences in luck, respectively. The first row in each panel provides the predicted average pair-wise Gini given the estimated prevalence of the fairness ideal, whereas the next three rows consider hypothetical situations in which all spectators (Panel A) and all stakeholders (Panel B) are motivated by one of the three fairness ideals.

By comparing the average pair-wise Gini in the first column for the different rows we can get an understanding of how the prevalence of fairness views affect post-distribution inequality. The number in the first column and in the first row of Panel A is the predicted post-distribution inequality when only spectators make choices given the estimated population shares and the actual source of pre-distribution inequality. The predicted average pair-wise Gini is 0.328, which is very close to the actual average pair-wise Gini of 0.323. As we would expect, the post-distribution inequality is larger with stakeholder decisions than with spectator decisions. The actual average pair-wise Gini in these situations is 0.594 and the corresponding prediction based on the estimated population shares is 0.615.

When we move to the situation in which all individuals are motivated by outcome egalitarianism (the second row in each panel), the predicted post-distribution inequality in Panel A falls to 0.143. The predicted post-distribution inequality also decreases, from 0.615 to 0.530, for the situations where stakeholders make decisions.

The reduction in the predicted inequality is considerably smaller in both Panels for a similar move to the situation in which everyone acts on the choice egalitarian ideal, reflecting the fact that, according to this ideal, some inequalities are fair. Finally, the last row reports the post-distribution inequality when everyone holds the luck egalitarian view. In this situation the pre-distribution income distribution is viewed as fair. We observe that the predicted inequality then increases compared to the situation with the estimated composition of fairness views.

[Table 8 about here.]

By comparing the three columns in Table 8, we see how the source of inequality, for a given distribution of fairness views, affects the willingness of people to redistribute. In our model, only the behavior of choice egalitarians is affected by a change in the source of inequality, and the effect of such a change is therefore greater, the larger the share of choice egalitarians.

Looking at the first row in each panel, we observe that if all pre-distribution inequalities were a result of differences in choice, the predicted level of post-distribution inequality would increase and, if all pre-distribution inequalities were a result of luck, the predicted level of post-distribution inequality would decrease. The change in the predicted level of inequality is a result of the change in the behavior of the choice egalitarians, and we observe that the effects are larger under the assumption that all individuals are choice egalitarians. In the hypothetical situations where there are no choice egalitarians, the source of inequality does not matter for the predicted Gini.

5.4 Political views and beliefs

At the end of the experiment, we posed certain attitudinal questions to the participants. First, they identified their political views, i.e., how they would place themselves on a seven point scale with with very left wing and very right wing as the extreme points. Second, they responded to a question on their beliefs about what factors determine life outcomes, specifically, how they would place themselves on a ten point scale with "Hard work usually brings a better life" and "Hard work doesn't generally bring success - it's more a matter of luck and connections" as endpoints. It is interesting to study how the prevalence of different fairness views relates to the answers to these questions.

At the end of the experiment we asked the participants about their political views (how they would place themselves on a seven point scale with with very left wing and very right wing as the extreme points) and their beliefs about what factors that determine life outcomes (how they would place themselves on a ten point scale with "Hard work usually brings a better life" and "Hard work doesn't generally bring success – it's more a matter of luck and connections"). It is interesting to study how the prevalence of different fairness views relate to the answer to these questions.

In order to address this question we calculate the a posteriori probabilities that an individual participant, given his choices in the experiment, has a given fairness ideal. We calculate the individual a posteriori probabilities by applying Bayes' theorem to the full probability model outlined in section 5.1.

$$P(k|y,Z) = \frac{P(y|k,Z)P(k|Z)}{P(y|Z)} \quad \text{for } k \in \{OE, CE, LE\}. \tag{9}$$

Here y is the choice made in a situation described by the vector Z. From (7) and (8), these probabilities are straightforward to calculate.[3]

After calculating the individual a posteriori probabilities we can study how the average a posteriori probabilities depend on the self-reported data. Table 9 reports how the average a posteriori probability of having each of the three fairness ideals depends on political views, beliefs about which factor is important for life outcome and gender.

[Table 9 about here.]

We observe that individuals who are classified as left-wing are much more likely to be outcome egalitarians and much less likely to be luck egalitarians than those who are classified as right-wing. Those who believe that hard work is important for life outcome is more likely to be choice egalitarian or luck egalitarian than those who believe that luck is most important. The effect is, however, smaller than the effect of political views. Finally, we observe that the a posteriori probability of having each of the ideals is almost the same for men and women.

These results are quite interesting in what they suggest about the relationship of the experimental results to ideological positions people take outside the laboratory. Specifically, we see the connection between assumptions about responsibility for one's lot in life and views toward the fair distribution of the proceeds from risk-taking: those who believe the luck is not particularly determinative of life outcomes favor letting rewards reflect choices and possibly also luck. Fairness ideals also relate to political ideology in plausible ways: those on the left prefer to equalize, not holding people responsible for their choices or their luck, whereas those on the right let the chips fall where they may, letting people bear the full consequences of their choices, including the uncertain outcomes of their choices. Gender, on the other hand, which is a non-ideological and non-ethical variable,

[3]The expression $P(y|k,Z)$ corresponds to $L_i^k(\boldsymbol{\theta})$ as defined in (7), $P(k|Z)$ is simply the population share λ^k, and $P(y|z)$ is the total likelihood contribution $L_i(\boldsymbol{\theta})$ defined in (8). For further discussion see Cappelen, Drange Hole, Sørensen, and Tungodden (2007a).

does not matter for views of fairness. These results suggest that the differences observed in the experiment relate to differences outside the laboratory in assumptions about the sources of inequalities and about what people are responsible for as opposed to fundamental disagreements whether responsibility should matter.

6 Concluding remarks

Individual differences in the willingness to take risk and differences in luck among those who do take risk are important sources of income inequality. From a political economy point of view it is, therefore, interesting to understand how people view such inequalities. This paper has addressed this question, and we find that the large majority of participants share the view, implied by both choice egalitarians and luck egalitarians, that people should be held responsible for their choice to take risk and that there should be no redistribution between risk-takers and those who choose the safe alternative. A majority also share the view, implied by outcome egalitarians and choice egalitarians, that there should be redistribution between lucky and unlucky risk takers. These conclusions have important implications for the distribution of rewards and responsibilities for risk taking across a wide range of social policies. For example, this suggests that tax policy should permit risk takers to benefit from their choices but that taxes on winners should help compensate risk takers who lose. As a further point, we find that these results are robust with respect to alternative methods of social preference derivation: similar preferences are derived using spectator distributive choices and by inferring stakeholder fairness preferences from their choices, bolstering the validity of both methods.

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Table 1: Risk choices made by participants.

	Risk choice		
Value of safe alternative	safe alternative	risky alternative	Total
25	0	78	78
200	5	73	78
300	28	50	78
400	71	7	78
	104	208	312

Table 2: Combinations of risk choices in the data set

	Risk choice of second stakeholder		
Risk choice of first stakeholder	safe alternative	risky alternative	Total
safe alternative	152	56	208
risky alternative	56	360	416
Total	208	416	624

Note: Calculated for all stakeholder distributive situations.

Table 3: Distributive choices.

	Stakeholder	Spectator
mean	0.235	0.507
median	0.125	0.500
standard deviation	0.249	0.261
min	0.000	0.000
max	1.000	1.000
n	530	283

Note: Statistics of $(X - y)/X$, where X is the total income generated by the two stakeholders $X - y$ is what the dictators give to the second stakeholder (or what spectators give to the second stakeholder). Situations where $X = 0$, i.e. situations where both stakeholders choose the risky alternative and lost, are not included in the calculations.

Table 4: Distributive choices conditional on outcome

	Outcome opponent (stakeholders)		
	safe	lucky	unlucky
safe	0.256	0.312	0.121
	(0.018)	(0.057)	(0.033)
lucky	0.139	0.211	0.112
	(0.033)	(0.023)	(0.017)
unlucky	0.461	0.310	
	(0.053)	(0.031)	
	Outcome of second stakeholder (spectators)		
	safe	lucky	unlucky
safe	0.516	0.696	0.241
	(0.020)	(0.048)	(0.070)
lucky	0.323	0.479	0.334
	(0.031)	(0.026)	(0.311)
unlucky	0.721	0.677	
	(0.063)	(0.042)	

Note: Averages of $(X - y)/X$, standard errors in parentheses.

Table 5: Distributive choices between lucky and unlucky risk-takers conditional on the value of the safe alternative

	stakeholder		spectator	
safe alternative	$(0,1)$	$(1,0)$	$(0,1)$	$(1,0)$
25	0.335	0.068	0.676	0.349
	(0.051)	(0.019)	(0.079)	(0.043)
	$n=38$	$n=38$	$n=17$	$n=24$
200	0.272	0.122	0.682	0.325
	(0.045)	(0.026)	(0.067)	(0.057)
	$n=39$	$n=39$	$n=21$	$n=25$
300	0.344	0.198	0.670	0.304
	(0.081)	(0.058)	(0.072)	(0.086)
	$n=15$	$n=15$	$n=11$	$n=7$

Note: Averages of $(X-y)/X$, standard errors in parentheses. For the stakeholders the column indication of $(0,1)$ means that the stakeholder was unlucky and the opponent was lucky, while $(1,0)$ means that the stakeholder was unlucky and opponent was lucky. The reported figure is the share offered to the opponent. For the spectators the column indication of $(0,1)$ means that spectator 1 was unlucky and spectator 2 was lucky, while $(1,0)$ means that stakeholder 1 was lucky and stakeholder 2 was unlucky. The reported figure is the share assigned to stakeholder 2.

Table 6: Estimates of choice model

	(1)		(2)		(3)		(4)		(5)	
parameter	type-I	type-II	type-I	type-II	type-I	type-II	type-I	type-II	type-I	type-II
λ^{OE}	0.288		0.274	0.302	0.381		0.500			
	(0.061)		(0.086)	(0.119)	(0.080)		(0.063)			
λ^{CE}	0.293		0.315	0.272	0.619				0.569	
	(0.066)		(0.095)	(0.136)	(0.080)				(0.066)	
λ^{LE}	0.419		0.411	0.427			0.500		0.431	
	(0.064)		(0.091)	(0.090)			(0.063)		(0.066)	
ζ	3.094	6.959	3.094	6.960	1.612	3.554	3.039	4.984	3.012	4.901
	(0.501)	(0.680)	(0.503)	(0.683)	(0.590)	(0.886)	(0.491)	(0.676)	(0.486)	(0.686)
σ	4.379	4.661	4.378	4.660	4.667	5.102	4.059	4.227	3.910	4.381
	(0.653)	(0.706)	(0.655)	(0.706)	(0.639)	(0.907)	(0.593)	(0.642)	(0.564)	(0.670)
γ	15.571		15.577		10.718		14.525		13.241	
	(0.498)		(0.509)		(0.259)		(0.488)		(0.458)	
$\log L$	-1807.19		-1807.13		-2067.62		-1930.85		-1971.60	

Note: The likelihood is maximized using the FmOpt library (Ferrall 2005). One population share (λ^k) and its standard error is calculated residually. Standard errors (in parentheses) are calculated using the outer product of the gradient (Berndt, Hall, Hall, and Hausman 1974).

Table 7: Shares given to others normalized by average share given

	Stakeholders					
	actual data			simulated data		
	safe	lucky	unlucky	safe	lucky	unlucky
safe	1.087	1.327	0.513	0.972	1.221	0.632
lucky	0.589	0.899	0.476	0.633	0.876	0.635
unlucky	1.957	1.316		1.869	1.362	
	Spectators					
	actual data			simulated data		
	safe	lucky	unlucky	safe	lucky	unlucky
safe	1.017	1.374	0.476	0.989	1.256	0.450
lucky	0.637	0.945	0.659	0.729	0.990	0.659
unlucky	1.422	1.336		1.519	1.319	

Note: Based on 1000 simulated datasets using the situations in the dataset but with β and fairness ideal randomly allocated in accordance with estimates from Table 6.

Table 8: Pairwise Gini

	A. Spectators		
	Cause of inequality		
	Actual	Only choice	Only luck
Predicted estimated population	0.328	0.398	0.293
Predicted, all people E:	0.146	0.146	0.146
Predicted, all people CE:	0.259	0.498	0.146
Predicted, all people LE:	0.498	0.498	0.498
	B. Stakeholders		
	Cause of inequality		
	Actual	Only choice	Only luck
Predicted estimated population	0.615	0.648	0.600
Predicted, all people E:	0.530	0.530	0.530
Predicted, all people CE:	0.580	0.694	0.530
Predicted, all people LE:	0.694	0.694	0.694

Note: The average pairwise Gini ($|y_1 - y_2|/X$), calculated on pairs where $X > 0$.

Table 9: Average a posteriori probabilities by self-reported information

	Political view		Important factor for life outcome		Gender	
	left	right	hard work	luck	male	female
$P(OE\|Z)$	0.368	0.248	0.267	0.317	0.292	0.278
	(0.052)	(0.034)	(0.034)	(0.050)	(0.035)	(0.051)
$P(CE\|Z)$	0.319	0.280	0.322	0.253	0.281	0.328
	(0.045)	(0.033)	(0.037)	(0.039)	(0.032)	(0.051)
$P(LE\|Z)$	0.313	0.473	0.411	0.430	0.427	0.394
	(0.049)	(0.042)	(0.043)	(0.051)	(0.039)	(0.061)
N	40	79	68	51	89	30

Note: Simple average of a posteriori probabilities calculated according to (9), using the estimates of the preferred specification (1) of Table 6. Standard errors in parentheses.

The question on political view was "Below is a seven-point scale on which the political views that people might hold are arranged from very left-wing to very right-wing. Where would you place yourself on this scale?", and we have classified 1 (very left-wing) to 4 (moderate) as "left". The question on important factor for life outcome was "Please choose a point on this scale: 1 (In the long run, hard work usually brings a better life) to 10 (Hard work doesn't generally bring success – it's more a matter of luck and connections", and we have classified 1 to 3 as "hard work".