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# A Meritocratic Origin of Egalitarian Behavior

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**Abstract:** The meritocratic fairness ideal implies that inequalities in earnings are regarded as fair only when they reflect differences in performance. Consequently, implementation of the meritocratic fairness ideal requires complete information about individual performances, but in practice, such information is often not available. We study redistributive behavior in the common, but previously understudied, situation where there is uncertainty about whether inequality is reflecting performance or luck. We show theoretically that meritocrats in such situations can become very egalitarian in their behavior, and that the degree to which this happens depends on how they trade off the *probability* of making mistakes and the *size* of mistakes that they risk making when redistributing under uncertainty. Our laboratory experiments show, in line with our model, that uncertainty about the source of inequality provides a strong egalitarian pull on the behavior of meritocrats. In addition, the external validity of our framework, and the results from the laboratory, are supported in two general population surveys conducted in the United States and Norway.

**Key words:** inequality, fairness, redistribution, responsibility, performance, luck, experiment, survey.
**JEL codes:** C91, D63, D81, H23.

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## 1. Introduction

A person holding a meritocratic fairness ideal regards inequality in earnings as fair if they reflect differences in performance, but not otherwise. This fairness ideal has been shown to be prevalent in both the laboratory and the field (c.f. Fong, 2001; Cappelen et al., 2007; Cappelen et al, 2013; Almås et al., 2016; Cappelen et al., 2017; Karadja et al., 2017; Gärtner et al., 2017; see also Piketty, 1995; Alesina and Angeletos, 2005; Benabou and Tirole, 2006). However, since the meritocratic ideal considers the *source* of income inequality morally relevant, it is not straightforward to implement in situations where there is uncertainty about the source of inequality. Despite such uncertainty being common, we know very little about how meritocrats behave in such circumstances; this is what we study in the present paper.

The following situation illustrates the challenge that a meritocrat faces when there is uncertainty about the source of inequality. Consider two individuals where one earns more on a task than the other individual. It is, however, not clear whether the unequal earnings reflect differences in performance (in which case the individual with the higher earnings is also the best performer) or luck (in which case the individual with the lower earnings could be the best performer). When deciding whether to redistribute earnings between these two individuals, a meritocrat has to make a trade-off between two potential mistakes. On the one hand, if she chooses to redistribute, she might eliminate an inequality that reflects differences in performance. On the other hand, if she chooses not to redistribute, she might accept an inequality that does not reflect performance differences.

To the extent that earnings are an informative signal of performance, i.e., it is at least weakly more likely that the individual with the highest earnings is also the best performer, the first mistake is more likely than the second. A meritocrat would therefore minimize the expected deviation from what she considers fair by treating the highest earner as if she was indeed the best performer. This, however, would also involve the possibility of very large deviations from fairness because the best performer might end up with the lowest income. To minimize the size of the largest possible deviation from fairness, the meritocrat would rather have to equalize the income of the two individuals.

We use a simple theoretical framework to illustrate this trade-off, and to guide our thinking about redistributive choices in this kind of situation. The model shows that uncertainty generates an "egalitarian pull" to the behavior of meritocrats. Further, the strength of this pull is increasing in the convexity of the loss function, i.e., the extent to which the individual deciding about redistribution has a relatively stronger distaste for making larger (but less probable) errors compared to making smaller (but more probable) errors.

We conduct a laboratory experiment to investigate the behavior of meritocrats under uncertainty and test the predictions of the model. The first part of our laboratory experiment is a *work stage* where participants perform a task. In the second part, the *earnings stage*, participants are randomly matched in pairs. One person in the pair is allocated a high earning of USD 20 for her performance in the work stage, whereas the other person is assigned a low earning of USD 0. This allocation comes about in one of two ways: either the high earning is allocated to the person who performed the best in the work stage, or it is allocated by a coin flip.

In the third part, *the redistribution stage*, an impartial spectator decides how to split the total earnings of the two people in the pair between them. The experiment varies the probability that the initial earnings allocation is determined by performance. The spectator is informed about this probability, but not about who actually performed the best – however, in our experimental design, the fact that a person was allocated the high earning is at least a weakly informative signal of superior performance.

We document that over 75 percent of the participants in the laboratory experiment can be described as meritocrats in the sense that they allocate the highest income to the best performer when there is *no uncertainty* about who this is. On average, the meritocrats award close to 90 percent of the total earnings to the high earner in this situation. Furthermore, we document that the meritocrats become significantly more egalitarian in their behavior when there is uncertainty about the source of inequality. When, for example, the probability that the high earner was also the best performer is 75 percent, the meritocratic spectators let the high earner keep less than 60 percent of the total earnings. Taken together, our findings reveal an intuitive, but, to the best of our knowledge, previously undocumented meritocratic origin of egalitarian behavior. In the face of uncertainty, individuals with meritocratic preferences act in an egalitarian manner in their distributive choices.

To investigate the external validity of our framework and findings, we also conduct two large-scale surveys of the general populations of the United States and Norway. We confirm the relevance of our framework as we document both Americans and Norwegians viewing earnings as, at best, an imperfect signal of superior performance– i.e., the kind of uncertainty that we are investigating is perceived as being prominent in society. In both countries, the surveys also document that a vast majority of people can be described as meritocrats in the sense that they find it more fair when hard work and talent determine earnings than when luck does (80 percent of the Norwegian and close to 70 percent of the American population subscribe to this fairness view). Finally, we document that uncertainty about the source of an inequality makes both American and Norwegian meritocrats more willing to redistribute income. Moreover, this tendency is stronger in

Norway than in the United States, and in that sense, our findings provide a potential explanation for why societies can differ significantly in their support for egalitarian institutions, even if they share the same meritocratic fairness ideal.

Our paper contributes to the extensive literature that seeks to understand how social preferences shape behavior (Fehr et al., 1993; Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000; Andreoni and Miller, 2002; Charness and Rabin, 2002; Cappelen et al., 2007; Bartling et al., 2012; Falk and Szech, 2013; Bartling et al., 2015; Mollerstrom et al., 2015; Almås et al., 2017; Hufe et al., 2018). An important strand of this research investigates how the source of an inequality matters for whether it is perceived as fair. Regardless of ewhether this research uses surveys (Alesina et al., 2001; Fong, 2001; Karadja et al., 2017; Gärtner et al., 2017) or laboratory experiments (Konow 1996; 2000; 2009; Cappelen et al., 2007; Krawczyk, 2010; Cappelen et al., 2013; Cappelen et al., 2017; Bartling et al., 2018), the nearly unanimously reached conclusion is that inequalities that are due to luck are regarded as less fair than those rooted in performance differences.[1] We add to this literature by studying how *uncertainty* about the source of inequality affects distributive behavior.

Our paper also relates to a small but growing literature that considers the effects of uncertainty on redistributive preferences. Cettolin and Riedl (2016) show that there is less redistribution attempted when there is uncertainty about whether low earners in the experiment would actually benefit from the redistribution. Charness et al. (2015) consider the related question of optimal compensation in a gift-exchange game under uncertainty about employee ability levels. Cappelen et al. (2018) study the trade-off between giving some individuals more and others less than they deserve in situations with limited information, and find that people are more averse to giving people less than they deserve. Bortolotti et al. (2018) consider the impact of uncertainty regarding

[1] See also Piketty 1995; Alesina and Angeletos, 2005 and Benabou and Tirole, 2006 for seminal theoretical work focused on the formation of beliefs regarding sources of inequality.

whether a person has cheated or not on the willingness to redistribute, and document that the mere suspicion of cheating changes third party fairness views considerably. Finally, Cappelen et al. (2019) consider how people handle a situation with limited information where the earnings of an individual is determined by both productivity and luck.

The rest of the paper is organized as follows. Section 2 describes the design and implementation of the main experiment, and of a small experimental extension. Section 3 presents our theoretical framework, and Section 4 presents our experimental results. Section 5 describes the design, analysis, and results of the surveys, and Section 6 concludes.

## 2. Experimental Design

Each experimental session consisted of three parts: 1) the work stage, 2) the earnings stage, and 3) the redistribution stage. All participants made decisions in all parts. Participants were told at the beginning of the session that there would be several parts and that instructions would be given for one part at a time, right before the start of that part (all experimental instructions, including quizzes, are available in Online Appendix A).

In the work stage, all participants performed a math task in which they had five minutes to add up as many sets of five two-digit numbers as possible without using a calculator (Niederle and Vesterlund, 2007). Participants were not given a piece rate compensation, but were told that their performance might influence their earnings later in the experiment and that, were this to be the case, it would be beneficial to have completed more tasks correctly.

In the earnings stage, participants were paired anonymously. Each pair was informed that one participant had earned USD 20 and the other USD 0 for the work completed in the work stage; they would, however, only receive the information about whether they themselves were a high or low earner at the very end of the experiment. Furthermore, the participants were told that the earnings had been determined by either luck or performance. In the case of luck, the participant who was lucky in a computerized fair coin toss had earned USD 20, whereas in the case of performance, the participant who completed the most math tasks correctly in the work stage had earned USD 20 (ties were broken randomly by the computer).

Thereafter, the redistribution stage was introduced. All participants were told that they had been matched to one of the pairs formed in the earnings stage, and that they would make choices regarding the distribution of earnings for that matched pair of participants (referred to as Person 1, P1, and Person 2, P2). It was made clear that this choice would have no monetary consequences for the participant herself as she was making decisions as an impartial spectator for another pair, not for her own pair. We used the strategy method, with each spectator exposed to, and making decisions in, seven situations involving P1 and P2. The spectators knew that one of the seven situations corresponded exactly to what had happened in their matched pair (but they did not know which one), that there were exactly two spectators matched to each pair (this was done in order for each pair to be matched to the same number of spectators), and that one of the two spectators' choices in this situation would be chosen randomly and implemented as final earnings for the pair.

In each of the seven situations, the spectators were informed about who in the pair had earned USD 20 and who had earned USD 0. They were furthermore informed about the probability that performance determined the earnings allocation. In the seven situations, this probability took on the values 0, 1, 10, 50, 90, 99, and 100 percent. The order was randomized, and in the main analysis we use all choices, but our conclusions remain when only analyzing participants' first choices (Figure B1 and Table B1 in Online Appendix B). The spectators could redistribute any amount (including zero) between P1 and P2 in each of the seven situations.

After the spectators had made their impartial spectator decisions, but before any information about final earnings was provided, all participants filled out a demographic questionnaire (age, gender, and ethnicity), which also contained incentivized questions about the statistical concept "probability" and unincentivized questions about personal risk preferences and redistribution preferences.[2] Finally, before leaving the laboratory, they were paid in private according to the selected spectator decision. .

### *2.1. Implementation*

The experiment was conducted at the Interdisciplinary Center for Economic Science (ICES) laboratory at George Mason University (GMU). Participants were recruited from the laboratory's subject pool, which consists of students from GMU. A total of 222 individuals, who could only take part once, participated. The average age was 22 years, and females made up 48 percent of the sample. Participants earned an average of USD 20 (including a fixed show-up fee of USD 5) for their participation in a session that lasted approximately 45 minutes.

We used z-Tree software (Fischbacher, 2007) to computerize the experiment. To ensure common knowledge, the experimental instructions were read aloud in addition to being provided on the participants' computer screens. On three occasions, participants answered a quiz to ensure that they understood the instructions. They had to be able to correctly answer the questions to continue, and the very few participants who experienced problems with the quiz questions were

[2] To determine their knowledge of the statistical concept "probability," participants answered nine simple questions and were rewarded USD 0.50 for each correct answer. The questions told them to imagine a lottery with a certain probability of winning, and that they were buying 100 lottery tickets and giving one ticket to each of their 100 best Facebook friends. We then asked the participants to tell us how many of their friends, statistically speaking, they would expect to win in the lottery. The probability of winning varied between 0, 1, 5, 10, 50, 90, 95, 99 and 100 percent across the nine questions. We added this to the experiment in order to be able to investigate if our results differ depending on whether participants with limited knowledge in statistics are included in the analysis or not. This turned out not to be the case – see Figures B2 and B3, and Table B2 in Online Appendix B.

given repeated instructions by the experimenter until they got the questions right. We implemented the quizzes to minimize the risk that subject confusion would obscure the results.

### *2.2. Experimental Extension: Compound Uncertainty*

Four months after the first data collection, we designed and implemented an extension of the original experiment. The objective was twofold: First, we were interested in examining if additional, compound uncertainty would add to the inclination of meritocrats to behave in an egalitarian manner. Second, we wanted to ensure that the results from the main experiment could be replicated.

The design built closely on the original experiment, but now we implemented two between-subject treatments. The *control treatment* was identical to the original experiment. In the *compound uncertainty treatment*, the spectators were told that the earnings division in the pair had been determined by either luck or performance. They were further told that the probability that performance determined the outcome could be either 0, 1, 10, 50, 90, 99, or 100 percent and that all seven options were equally likely. Just as in the control treatment, the spectators made seven decisions. The probability that performance determined the outcome was different in the seven situations (just as in the original experiment), but described as a compound lottery in each situation.

A total of 82 people who had not participated in the main experiment took part in the experimental extension (51 percent female, average age 22 years). They earned an average of USD 19.50 for their participation in a 45-minute long session. Treatments were randomized at the session level, and with the exception of the differences outlined above, the implementation of the experimental extension was identical to that of the main experiment.

## 3. Conceptual Framework

We use a simple social preference model to help us to formulate hypotheses, and to organize the analysis and the interpretation of our results. We denote the two people in a pair *H* (high earner) and $L$ (low earner). Their initial (*pre*-redistribution) earnings are such that *H* has a larger share $s$ of total earnings than $L$, i.e. $s_H^{PRE} > s_L^{PRE}$. Redistribution is costless in the sense that the total earnings *post*-redistribution are the same as total earnings pre-redistribution.

We assume that the spectators find it fair that *H*, after redistribution, receives a share $s_H^{FAIR}$ of the total earnings (and that $L$ consequently receives a share $s_L^{FAIR} = (1 - s_H^{FAIR})$). We furthermore assume that the spectators dislike it when the distribution of the total earnings post redistribution deviates from what they view as fair, and we capture these preferences with a general loss function,

$$V(s_H^{POST};\cdot) = -(|s_H^{POST} - s_H^{FAIR}|)^{\alpha}, \tag{1}$$

where $\alpha$ captures the loss function's curvature.

We allow spectators to hold different views about what the fair share to *H,* $s_H^{FAIR}$, is. First consider a spectator who does not view the source of the inequality as relevant when deciding about redistribution, meaning that her fairness view is independent of whether *H* was actually the best performer. For such a spectator, there is no uncertainty about what the fair share to *H* is, and she can therefore ensure a fair distribution simply by setting $s_H^{POST} = s_H^{FAIR}$. One example of such spectators is those with a strict egalitarian fairness ideal who view all inequalities as unfair. These spectators have $s_H^{FAIR} = 1/2$ and *always* equalize outcomes.[3]

We are primarily interested in the meritocrats, for whom the source of the inequality is crucial. This implies that for them, $s_H^{FAIR}$ is dependent on whether or not the high earner *H* is also the best performer. We definea spectator to embrace the meritocratic fairness view if she considers it fair that the individual who is the best performer (*BEST*) gets a share $s_{BEST}^{FAIR} > 1/2$ of the total earnings in the pair. Hence in a situation where *H* is the best performer, the meritocrat has $s_H^{FAIR} = s_{BEST}^{FAIR} > 1/2$. (If *H* is not the best performer, $s_H^{FAIR} = (1 - s_{BEST}^{FAIR}) < 1/2$).

In a situation with no uncertainty about *H* being the best performer, meritocrats will simply set $s_H^{POST} = s_H^{FAIR}$. Under uncertainty, however, a meritocrat cannot be sure that she implements the distribution that she considers fair, as this depends on who actually performed the best.

Let $p$ be *the probability that the high earner was also the best performer* and let $p \geq 1/2$ (as in the experiment). This implies that the fact that a person has high earnings sends a signal about her also being the best performer, with the signal being at least weakly informative (i.e., the signal-to-noise ratio is always at least 50 percent). Expanding equation (1) then gives us the expected loss for a meritocratic spectator:

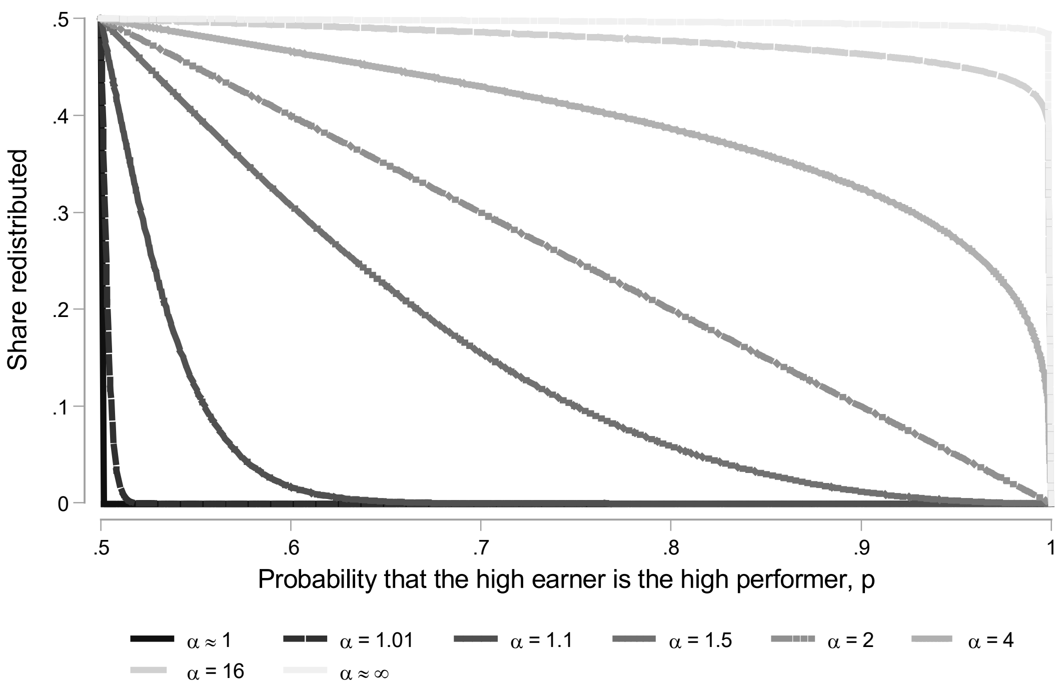
$$E(V(s_H^{POST};\cdot)) = -p(|s_H^{POST} - s_{BEST}^{FAIR}|)^\alpha - (1-p)(|s_H^{POST} - (1 - s_{BEST}^{FAIR})|)^\alpha \qquad (2)$$

If a meritocratic spectator has a linear loss function, i.e., if $\alpha = 1$, she simply aims to minimize the expected deviation from what she views as the fair distribution. She will then give the

[3] Strict libertarians would also remain unaffected by the source of inequality, as they find all initial inequalities in earnings fair. Since $s_H^{PRE} = 1$ in our experiment, we have that $s_H^{FAIR} = 1$ for strict libertarians. See e.g. Cappelen et al., 2007 and Mollerstrom et al., 2015 for definitions, and discussion, of the concepts of strict egalitarianism and libertarianism.

highest earner a share of the total payment equal to $s_{BEST}^{FAIR}$ as long as the signal is informative, $p > 1/2$. In the case where $p$ = 1/2, she is indifferent between giving $s_{BEST}^{FAIR}$ to the high or the low earner. In contrast, a meritocrat with $\alpha \to \infty$ will equalize the incomes in the pair for all values of $p < 1$, because this minimizes the largest possible deviation from what she considers to be a fair distribution. Figure 1 illustrates the predicted share redistributed in this framework for various values of $\alpha$ in the case where $s_{BEST}^{FAIR}$=1.

***Figure 1: Predicted Share Redistributed for Meritocrats with Different Values of α***




*Notes: The figure shows the relationship between the level of uncertainty and the optimal share redistributed given (2) and assuming that* $s^{s_{BEST}^{FAIR}=1} = 1$*. For* $0.5 < s_{BEST}^{FAIR} < 1$ *the plot is similar, with the floor moved up to* $(1 - s_{BEST}^{FAIR})$.

We see that any value of $\alpha > 1$ implies an egalitarian pull, in the sense that it makes meritocrats split more equally than what they do when they know for sure who was the best performer. More generally, a higher value of $\alpha$ makes the meritocratic spectator split relatively more equally;

the pull toward egalitarian behavior under uncertainty is therefore increasing in $\alpha$. Also note that when $\alpha = 2$, i.e., when the loss function is quadratic, the amount of desired redistribution is decreasing linearly in $p$.

From Figure 1, we observe that spectators can have the same meritocratic fairness view and the same beliefs about the level of uncertainty, but still behave very differently because they differ in the curvature of their loss function. For example, consider two meritocratic spectators who both want the best performer to receive the full share, i.e., $s_{BEST}^{FAIR} = 1$. Further, assume that they are in a situation where there is a 75 percent likelihood that the high earner is also the best performer. Depending on the curvature of the loss function, i.e. their $\alpha$, one of the spectators may redistribute completely (very convex loss function) and the other may not redistribute at all (linear loss function).

## 4. Results

In this section, we present the main results from the experiments, with supplementary analysis presented in Online Appendix B. We first provide an overview of the aggregate behavior in the main experiment, before we present individual-level analysis and results from the experimental extension with compound uncertainty.

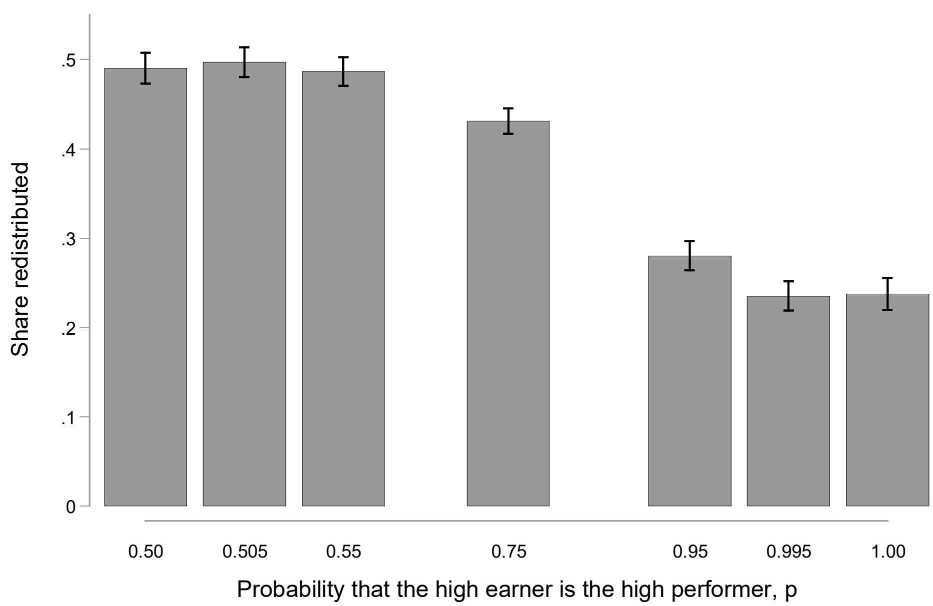
### *4.1 Aggregate Behavior*

We first provide an overview of the spectator behavior in the main experiment. Figure 2 shows the average share redistributed in each of the seven situations.[4]

[4] This graph looks very similar when only considering participants' first choice; i.e. when we utilize the between-subject version of our experimental design (see Figure B1 and Table B1 in Online Appendix B).

Comparing the two extreme situations in Figure 2, we observe that uncertainty creates an egalitarian pull. When the spectators know for sure that the high earner is the high performer, they find it, on average, fair that the high earner gets almost 80 percent of the total income. In contrast, we see almost complete equalization of income when earnings are uninformative of performance. We further observe that at the extremes, small changes in probability have almost no effect on spectator behavior, which is consistent with the average spectator not having a linear or infinitely convex loss function (c.f. Figure 1). Finally, we observe that the share distributed in the intermediate situation, where it is 75 percent probability that the high earner is the high performer, is above the linear prediction based on the two extreme situations, which is suggestive of the average spectator having a convex loss function with $\alpha > 2$.

***Figure 2: Share Redistributed for Different Values of p***




*Notes: The figure provides an overview of the average share redistributed in each of the seven situations considered in the experiment (n = 1554, 7 choices by 222 spectators). Error bars indicate standard errors (clustered on individuals).*

In Table 1, we confirm these patterns in a regression framework, where the dependent variable, share of earnings redistributed, is regressed on the probability that the high earner was the best performer. In Table 1, specification (1) has $p$ enter linearly, whereas specification (2) utilizes probability dummy variables (with $p = 0.5$ as the omitted variable). We observe from (1) that, on average, an increase in the probability that the high earner was the best performer significantly reduces the share redistributed, while (2) shows that the decrease in the share redistributed is significant when $p>=0.75$.

***Table 1: Share Redistributed as a Function of p***

| | (1)<br>Redist | (2)<br>Redist |
|---|---|---|
| $p$ | -0.519*** | |
| | (0.040) | |
| $p = 0.505$ | | 0.007 |
| | | (0.017) |
| $p = 0.55$ | | -0.004 |
| | | (0.016) |
| $p = 0.75$ | | -0.059** |
| | | (0.020) |
| $p = 0.95$ | | -0.210*** |
| | | (0.023) |
| $p = 0.995$ | | -0.255*** |
| | | (0.022) |
| $p = 1.00$ | | -0.253*** |
| | | (0.023) |
| Constant | 0.769*** | 0.490*** |
| | (0.031) | (0.017) |
| Observations | 1554 | 1554 |

*Note: OLS regressions utilizing the full dataset from the main experiment (n = 1554, i.e. 7 choices each by 222 spectators). The dependent variable is the share that the spectators redistribute to the lower earner. Standard errors (clustered at the level of individual spectators) in parentheses. (1) shows the result from a model linear in p (the probability that the high earner was also the best performer), while (2) uses a dummy for each level of p. Omitted variable in specification (2) is p = 0.5. Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.1.*

### *4.2 Individual-level Analysis*

Having documented average spectator behavior, we now look closer at individual spectators, paying special attention to how the meritocrats react to uncertainty about who is the best performer.

We define a meritocrat as a spectator who wants to allocate more than half of the total earnings to the high earner when there is no uncertainty about the high earner also being the best performer (i.e., when $p = 1$). We therefore focus our analysis on the 168 spectators (76 percent of our sample) who satisfy this requirement.[5] The 168 meritocrats redistribute 47.4 percent (standard error = 2.04, median = 50) when $p = 0.5$ and 11.5 percent (standard error = 1.11, median = 0) when $p = 1$.

We use a non-linear least squares estimator to estimate for each meritocratic participant the curvature parameter $\alpha$ from equation (2). We allow $s_{BEST}^{FAIR}$ (the fair share to the best performer) to vary at the individual level and set it equal to the share that an individual meritocrat allocates to the high earner when $p = 1$. The results of the individual estimations are shown in Figure 3. Panel A shows the distribution of $s_{BEST}^{FAIR}$, and Panel B shows the distribution of the estimated $\alpha$. We see from Panel A that the median value of $s_{BEST}^{FAIR}$ is 1, meaning that the median meritocrat does not redistribute anything to the low earner when the high earner is known with certainty to be the best performer. The mean value of $s_{BEST}^{FAIR}$ is 0.88. In Panel B, we observe that the median value of $\alpha$ is 2.5.[6]

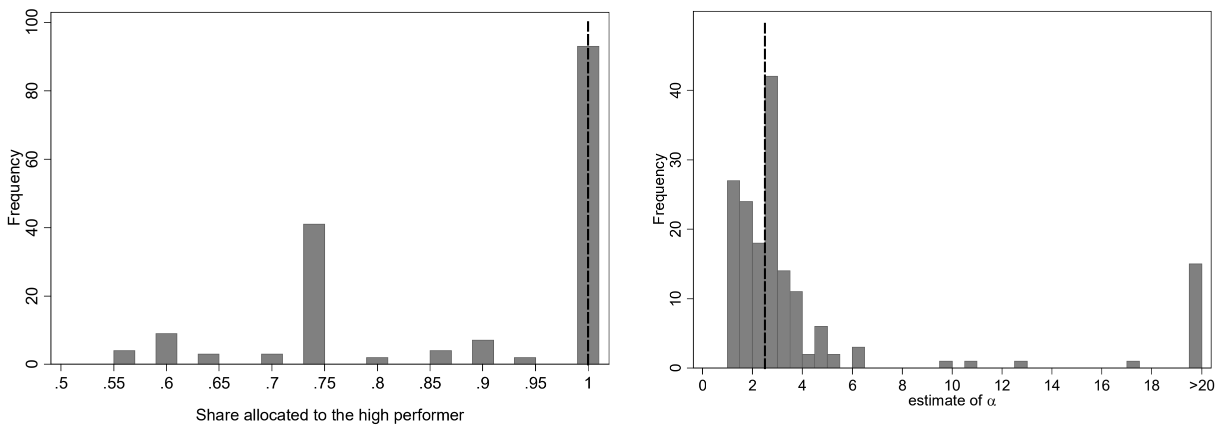
[5] Out of the 54 participants who are not classified as meritocrats according to this definition, 24 are strict egalitarians in the sense that they split the total earnings equally between the two people in the pair for all seven values of $p$. In Figures B4 and B5 in Online Appendix B we provide a descriptive analysis of the behavior of the participants who cannot be classified as meritocrats.

[6] There is no significant correlation between $s_{BEST}^{FAIR}$ and the estimated $\alpha$ (*β=0.024*, *p=0.420*). This shows that the curvature of the loss function for a person is not correlated with her fairness view on what share of the total pie the superior performer should get.

Panel A and B show that meritocrats differ in two important respects: in what they think of as the fair share to give to the best performer, and in the convexity of the loss function. Interestingly, in our sample, we observe that there is greater heterogeneity in the curvature of the loss function, with some meritocrats having an extremely convex loss function. The median $\alpha$ is well above 2 (73.1 percent of the meritocrats have $\alpha > 2 - p < 0.001$ for the t-test of proportions, testing the null hypothesis that this share is 50 percent). Most importantly, however, we find almost no meritocrats with an almost linear loss function, which means that for most meritocrats uncertainty creates a significant pull toward more egalitarian behavior.

***Figure 3: Individual-level Calibrations for the Meritocrats***

***Panel A: Distribution of $s_{BEST}^{FAIR}$*** ***Panel B: Distribution of Estimated $\alpha$***



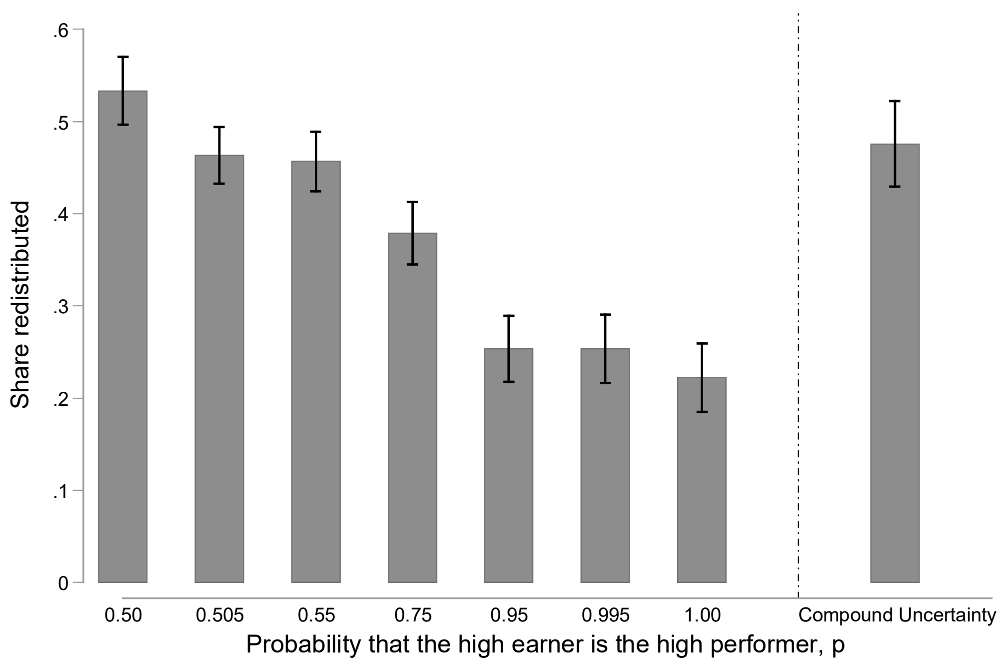

*Notes: The figures show the distribution of the share allocated to the best performer when p = 1 (Panel A) and the estimated α (Panel B). Data for all meritocratic spectators (N = 168). The dotted lines mark the medians of the respective distributions.*

### *4.3 The Experimental Extension with Compound Uncertainty*

The experimental extension, which consists of a control treatment and a compound uncertainty treatment, enables us to study how compound uncertainty shapes spectator behavior and the robustness of our initial findings. Figure 4 outlines the results with the rightmost bar depicting the average behavior of spectators in the compound uncertainty treatment. The seven left-most bars show the average behavior in the control treatment, which corresponds to the seven situations studied in the main experiment.

First, we observe that compound uncertainty creates a very strong egalitarian pull in spectator behavior. The average spectator behavior under compound uncertainty is not statistically different from strictly egalitarian behavior, and we observe that the spectators in the compound uncertainty treatment equalize significantly more than spectators in the control group when $p >= 0.75$.

***Figure 4: Results from the Experimental Extension***




*Notes: The figure provides an overview of the average share redistributed in the experimental extension. Data from the control treatment are reported in the seven leftmost bars (n = 315, 7 choices each by 45 spectators). Data from the compound uncertainty treatment is reported in the bar to the right (n = 259, 7 choices each by 37 spectators). Errors bars indicate robust standard errors, clustered at the individual spectator.*

Second, by comparing the spectator behavior under compound uncertainty with the spectator behavior in the situation in the control treatment where $p = 0.75$, we establish an estimate of the causal effect of introducing compound uncertainty on spectator behavior (because the expected value of the $p$ is the same in the two treatments). We observe that the introduction of compound uncertainty causes a large increase in the share transferred to the low earner (48 percent versus 37 percent, $p = 0.097$). Our data thus provide suggestive evidence of compound uncertainty causing a stronger egalitarian pull in the distributive behavior compared with simple uncertainty.

Finally, when inspecting the seven bars to the left in Figure 5, we note that behavior in the control treatment in the extension is very similar to that in the original experiment. Pairwise comparisons of average behavior for a given level of $p$ in Figure 2 and Figure 5 show that spectator behavior is not significantly different for any of the situations considered in the main experiment. Moreover, the median values for $s_{BEST}^{FAIR}$ (1) and the estimated $\alpha$ (2.5) are the same for participants in both the control treatment in the experimental extension and the original experiment.[7]

## 5. General Population Surveys

To investigate the external validity of our framework and results, we conducted two general population surveys in the United States (n = 1,002) and Norway (n = 1,019). Our objective for conducting the surveys was threefold. First, we wanted to investigate how common (and strong) meritocratic preferences are in the general population, second to what extent people view high earnings as an imperfect signal of superior performance, and third whether meritocrats react to

[7] See Table B3 and Figure B6 in Online Appendix B.

uncertainty by being pulled toward an egalitarian behavior. The survey materials are available in Online Appendix C.

### *5.1 Design and Implementation*

To obtain a measure of fairness preferences, our surveys ask the respondents to indicate to what extent they find it fair that certain factors determine a person's income. The factors considered were talent ($fair_{talent}$), luck ($fair_{luck}$), and hard work ($fair_{work}$). The answers were given on a 0-10 scale, with 0 indicating that the respondent finds it completely unfair if that particular factor determines income and 10 that she finds it completely fair. We call a person a meritocrat if she finds it more fair that talent and hard work determine income, than that luck does it, i.e., if $fair_{talent} > fair_{luck}$, and $fair_{work} > fair_{luck}$.

In the language of our model from Section 3, we also want to estimate respondents' perceptions of $p$ (i.e. how likely they think it is that a person with a high income is a superior performer). To that end, the survey asked whether respondents agree or disagree with the following statement: "In society, it is typically the case that people with a higher income have done a better job than people with a lower income" (0-10, with 0 indicating complete disagreement and 10 indicating complete agreement with the statement).

Finally, to get a sense of $\alpha$, i.e., of how respondents react to uncertainty about whether the high earner is also the best performer, we asked respondents to consider a situation where two people – Andrew and Bob – had been asked to do a job. The two had been told that the best performer would get a bonus of USD 200, while the other would USD 0 (the question asked the respondent to assume that everyone, including the respondent herself, agreed that this is fair). The question continues: "The problem is that there is uncertainty about who the best performer was.

Suppose that you learn that it is more likely that Andrew did the best job. With 75 percent probability he was the best performer, and with 25 percent probability Bob was the best performer. Without knowing any more, how much of the USD 200 would you give to Andrew and how much to Bob?"

In this setting, as shown in Figure 1, a person with a higher $\alpha$ would tend in the direction of splitting the earnings equally between Andrew and Bob. However, someone with $\alpha$ close to 1 would give all or most of the money to Andrew, who is most likely to be the best performer. In general, and in the language of our model, there is a negative correlation between the share given to Andrew and $\alpha$.

In addition, the surveys collected demographic information about age, gender, geographical location, household size, marital status, income, education, and political party preferences. The surveys were administered by Research Now (in the United States) and NorStat (in Norway) and the samples are representative of the respective populations in terms of gender, age, and location.

### *5.2 Main Results*

Table 2 outlines the results. Considering first the pooled data from both surveys, we start by noting that the respondents find it most fair when income differences are determined by hard work (the average answer is 8.41). Talent is considered less fair as a determinant of income (8.41 vs 6.44, $p < 0.001$ for a two-sided t-test of differences[8]), but at the same time more fair than luck (6.44 vs 3.17, $p < 0.001$). Comparing the answers to the midpoint of the scale (which is 5), we

[8] All p-values in this section are for two-sided t-tests (assuming unequal variances when appropriate) unless otherwise noted.

## *Table 2: Results from the Representative Surveys*

| | POOLED | UNITED STATES | | | NORWAY | | |
|---|---|---|---|---|---|---|---|
| | **Total** | Total | Democrats | Republicans | Total | Left of center | Right of center |
| **Fair_work** | **8.41** | 8.46 | 8.52 | 8.66 | 8.37 | 8.21 | 8.55 |
| | **(2.02)** | (2.18) | (1.94) | (2.15) | (1.85) | (1.88) | (1.78) |
| **Fair_talent** | **6.44** | 6.89 | 6.92 | 7.46 | 6.01 | 5.74 | 6.31 |
| | **(2.70)** | (2.80) | (2.78) | (2.59) | (2.52) | (2.51) | (2.42) |
| **Fair_luck** | **3.17** | 4.13 | 4.11 | 4.61 | 2.22 | 1.91 | 2.52 |
| | **(2.91)** | (3.02) | (3.12) | (3.02) | (2.45) | (2.21) | (2.57) |
| **Share meritocrats** | **0.73** | 0.66 | 0.65 | 0.68 | 0.80 | 0.80 | 0.82) |
| | **(0.44)** | (0.47) | (0.48) | (0.47) | (0.40) | (0.40) | (0.38) |
| **Perceived p** | **4.22** | 5.15 | 5.05 | 5.95 | 3.32 | 2.87 | 3.92 |
| | **(2.97)** | (3.00) | (3.08) | (2.79) | (2.64) | (2.41) | (2.77) |
| **Share gives all to Andew (α=1)** | **0.15** | 0.20 | 0.14 | 0.26 | 0.10 | 0.07 | 0.12 |
| | **(0.36)** | (0.40) | (0.35) | (0.44) | (0.30) | (0.25) | (0.33) |
| **Share to Andrew (inverted α-proxy)** | **0.67** | 0.70 | 0.68 | 0.73 | 0.64 | 0.62 | 0.66 |
| | **(0.19)** | (0.21) | (0.20) | (0.21) | (0.16) | (0.15) | (0.17) |
| **N** | **2,021** | 1,002 | 382 | 339 | 1,019 | 455 | 397 |

Notes: Averages in pooled data, and by country, and by country and political affiliation. Standard deviations in parentheses. "Fair_work", "Fair_talent" and "Fair_luck" are the answer to the question of how fair it is that a particular factor determines personal income (0-10 scale, 0=completely unfair, 10=completely fair). "Share meritocrats" is the share of respondents for whom fair_work>fair_luck and fair_talent>fair_luck. "Perceived p" is the answer to whether it is typically the case in society that people with a higher income have done a better job than people with a lower income (0-10 scale, 0=disagree completely, 10=agree completely). "Share gives all to Andrew" is the share of respondents who give the full reward to Andrew in the question described in the text (this corresponds to α=1). "Share to Andrew" is the average share that all responders state that they would give to Andrew, a higher value is a proxy for a lower value of α.

note that people on average find it fair when hard work and talent determine income (average answers significantly above 5, $p < 0.001$ for both tests), but on average unfair when luck does so (average answer significantly below 5, $p < 0.001$). We further observe that a large majority of respondents, 73 percent, can be described as having meritocratic preferences (the corresponding fraction from the laboratory experiment was very similar at 76 percent).

Importantly, we find that high income is not regarded as an informative signal of superior performance. The average answer is 4.22 which is significantly below the midpoint, 5, of the scale ($p < 0.001$), indicating that the average respondent tends to not agree that people with a higher income have done a better job than people with a lower income. This suggests that the kind of situation studied in the experiment captures a common and important distributive situation in society.

Finally, the answers to the question where it is uncertain whether Andrew or Bob was the best performer reveals firstly that only 15 percent of respondents would give the full reward to Andrew (who was the best performer with 75 percent probability). On average, the respondents stated that they would give 67 percent of the reward to Andrew (if we only consider the respondents who we define as having meritocratic fairness preferences, the share remains virtually unchanged, at 68 percent). Moreover, we find that the spectators are significantly closer to splitting the reward equally between the two individuals than to giving the high earner the full reward ($p < 0.001$ for the difference-in-difference test).

To conclude, the surveys provide evidence of the relevance of our experimental investigation, and the results are in line with our findings from the laboratory. We find that the meritocratic fairness preference is held by a majority of people and that people on average are skeptical of high income being an informative signal of superior performance. In this distributive setting, we validate our experimental finding by showing that there is a significant egalitarian pull in the distributive behavior of a meritocratic population.

### *5.3 Results by Country and Political Affiliation*

Building on the fact that Norwegians demand more redistribution than do Americans, we can use our survey to shed light on the extent to which reactions to uncertainty about the nature of the distributive situation might contribute to our understanding of why there is such a difference between the two countries.[9] We also compare liberals and conservatives (with the former demanding significantly more redistribution than the latter) within both Norway and the United States.

We now return to Table 2 and consider the results by country. The first column for each respective country is the average for the full population of that country. There are some notable similarities between Norwegians and Americans. In both countries, it is considered most fair when income is determined by hard work; there is no significant difference between Americans and Norwegians ($p = 0.313$). Talent as a factor determining income is seen as significantly less fair (the $fair_{talent}$ score is lower than the $fair_{work}$ score in both countries, $p < 0.001$), but the average score is still above the midpoint of the scale ($p < 0.001$ for both countries). Americans find it more fair than do Norwegians when income is based on differences in talent ($p < 0.001$). The largest difference between the countries is found for the luck factor, in line with Almås et al. (2019). Whereas both Americans and Norwegians find it mostly unfair when luck determines income (the score is below the midpoint in both countries, $p < 0.001$), Norwegians find it significantly more

[9] The differences between the United States and Scandinavia regarding demand for redistribution are of interests to economists and other social scientists – see e.g. Edlund, 1999; Aaberge et al., 2002; Jantti et al, 2006; Rogerson, 2007; Acemoglu et al, 2012; Aarøe and Petersen, 2014; Kleven, 2014; Fochesato and Bowles, 2015; Stiglitz, 2015, and Almås et al., 2019. See also Alesina and Glaeser, 2004 who discusses the difference between Europe and the United States, but also extensively discusses Scandinavia.

unfair than do Americans (2.22 vs 4.13, $p < 0.001$). In line with this, the share of meritocrats turns out to be higher in Norway than in the United States (80 percent vs 66 percent, $p < 0.001$).

We find a striking difference between the United States and Norway in terms of income being informative of performance. While Americans marginally find income to be informative of performance, Norwegians disagree strongly with this view (5.15 vs 3.32, $p<0.001$). This is suggestive of Norwegians perceiving there to be more uncertainty about who has been the best performer in society, which clearly pulls in the direction of more redistribution.

Finally, we note that there is a difference between how Norwegians and Americans react to uncertainty about who is the best performer. In the question about Andrew and Bob, we first note that Americans are significantly more likely than are Norwegians to give the full reward to the most likely best performer. On average, Americans allocate 70 percent of the pie to Andrew, whereas Norwegians allocate 64 percent ($p < 0.001$). Moreover, in both countries, people on average seem to have a convex loss function ($\alpha > 2$), as their behavior is closer to complete equalization than to giving Andrew the full share. These results also suggest that Norwegians on average have a more convex loss function than Americans, as they are closer to equalization of earnings ($p < 0.001$ for test of difference-in-difference).[10]

Taken together, the survey provides strong evidence of uncertainty creating a stronger egalitarian pull in Norway than in the United States. Norwegians are more likely than are Americans to be meritocrats, to perceive there to be significant uncertainty about who is the best performer, and to have a more convex loss function. All these three elements pull in the direction of higher demand for redistribution in Norway than in the United States.

[10] This cross-country result also holds when we, instead of using a t-test, regress the share given to Andrew on country, controlling for perceptions of $p$ and/or how (un)fair the person thinks it is that hard work, talent, and luck determine personal income. Additional demographic control variables (age, gender, household income can also be included without the result changing). See Online Appendix D, Table D1.

The analysis can also be done in terms of political affiliation, by comparing people identifying themselves as Democrats (liberal) or Republicans (conservative) in the United States, and by splitting Norwegians into "right-of-center" (conservative) and a "left-of-center" (liberal) blocks.[11] As reported in Table 2 and described in more detail in Online Appendix D, we see that our framework can also be relevant for understanding why people with a conservative political leaning demand less redistribution than do liberals. We document that conservatives regard it as more fair than liberals that luck or talent (and, in the case of Norway, hard work) determine an individual's income. In addition, conservatives also view high income as a more informative signal about superior work performance. Finally, liberals tend have a more convex cost function than conservatives (but the results for both groups, in both countries, indicate an average $\alpha > 2$). These three elements contribute to explain how uncertainty creates a stronger egalitarian pull for liberals than conservatives.

To conclude, the results from the survey support our framework being relevant for understanding differences in redistributive preferences and political opinions outside the laboratory. We show that the kind of distributive situation in the experiment, where there is uncertainty about who is the best performer, corresponds to how the general population think of high income as a signal of superior performance. Both Americans and Norwegians share the characteristic of having an $\alpha$ that is large enough to give rise to a significant egalitarian pull under uncertainty, regardless of whether a person identifies as liberal or conservative. Further, we document that in both societies, meritocratic fairness preferences appear to be prominent and people seem to have a convex loss

[11] About 72 percent of our American sample define themselves as identifying most strongly with the Republican or the Democratic party; the remainder say either that they identify with another party (7 percent) or that they do not identify with a party at all (21 percent). For Norway, we define as right of center the parties Fremskrittspartiet, Høyre, Venstre and Kristelig Folkeparti, whereas Rødt, Sosialistisk Venstreparti, Arbeiderpartiet, Miljopartiet De Gronne and Senterpartiet are left of center. 84 percent identify with one of these nine parties (which are the ones currently represented in the Norwegian parliament), whereas the rest identify with another party (1 percent) or with no party at all (15.3 percent).

function, which implies that in both societies uncertainty about who is the best performer creates an egalitarian pull in their distributive behavior.

## 6. Conclusions

When deciding on what constitutes a fair distribution of earnings, many people find the source of inequality highly important. More specifically, meritocrats find inequalities acceptable if they reflect performance differences, but not otherwise, and research has documented that people prefer less redistribution when effort generates (or is believed to generate) an inequality than when luck does so. However, there is often uncertainty about the source of inequality.

We report from an experiment that introduces a novel design of varying the degree of uncertainty about the source of inequality. We use a simple conceptual framework to show that a meritocrat can exhibit widely different distributive behaviors depending on how she reacts to uncertainty. Specifically, a meritocrat who has a strong, relative dislike of making large mistakes will experience an egalitarian pull to her behavior.

In the laboratory, we documented that a vast majority of participants hold meritocratic preferences in the sense that they let the high earner keep most of the earnings when there is no uncertainty about her also being the best performer. Further, while meritocrats vary widely in their response to uncertainty, a strong egalitarian pull is by far the most common response. Thus, we document a previously undocumented source of egalitarian behavior: meritocratic preferences in combination with uncertainty about whether income is a signal of performance.

We also report from a large-scale survey of representative samples of about 1,000 Norwegians and 1,000 Americans. The survey data confirm the external validity of our framework by showing that most people do not believe a high income to be a very reliable signal of superior performance. Moreover, the main findings from the laboratory are replicated in the general population surveys: meritocratic preferences are very common, and on average, meritocrats react to uncertainty by being pulled in the direction of egalitarian behavior. This implies that we find evidence of a meritocratic origin of egalitarian behavior both in the laboratory and in large, general population samples.

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# Online Appendix A: Experimental Instructions

## Experimental Instructions for the Main Experiment

**SCREEN: WELCOME**

**Hi and welcome!**

You will see instructions on your screen and we will also read the instructions to you, so please follow along.

In this experiment you can earn money. The amount will depend on your decisions and the decisions of the other participants.

The experiment has several parts where you can earn money. Instructions will be given ahead of each part.

At the end of the experiment your total earnings will be added to the show-up fee of $5 and you will be paid in private, in cash before you leave.

The experiment is conducted anonymously, and you and all other participants will be identified only by code numbers. You can find your code number on the small piece of paper on your desk.

We will go through the instructions for part 1 now. If you have any questions after you have read and heard the instructions, please raise your hand.

Otherwise, no communication is permitted during the study. You are also not allowed to use mobile phones or other electronic devices. Please make sure that these are turned off and put away.

**SCREEN: PART 1**

**Part 1**

In part 1 of this experiment you will do math tasks consisting of adding numbers. In each task you will see five two-digit numbers. Your task is to add them up and provide the correct answer.

You have five minutes available to do as many of these tasks as you can. You are not allowed to use a calculator, but feel free to use the scrap paper that is available on your desk if you like.

Your performance in this part - how many tasks you did correctly - may influence how much you earn in this experiment. Doing more tasks will in that case always be better.

**SCREEN: MATH TASK**

**[math tasks]**

**SCREEN: END OF MATH TASK**

It has now been recorded how many math tasks you did correctly.

Please press ok to proceed.

**SCREEN: PAIRING**

**Pairs**

All of you who are in this room will be matched in pairs.

That means that you will be randomly and anonymously matched to another participant who is here.

You will not be told who the other participant is, and neither will the participant that you are paired with be told who you are.

**Earnings from part 1**

In each pair one participant will earn $20 and the other participant $0 for the work done in part 1. Who earns the higher earnings in a pair will be determined in one of the following two ways:

1. By **luck.** In this case the participant who is lucky in a computerized coin toss earns $20 (and the other one earns 0).

2. By **performance.** In this case the participant who did most math tasks correctly earns $20 (and the other one earns 0).

**SCREEN: QUIZ 1**

We will now make sure that everyone has understood the instructions for how the earnings are determined. When you have answered the questions below, please click the button at the bottom of the screen to proceed.

If any of your answers are incorrect, the computer will tell you so and you have to answer that question again.

**Question 1**
Which alternative is true?
- Both participants in each pair earn $10

- One participant in the pair earns $20, the other participant earns $0

- One participant in the pair earns $15, the other participant earns $5

**Question 2**
Which alternative is true if luck determines who in the pair earns $20?

- Both participants in the pair have the same chance to earn $20

- Both participants in the pair will only earn $0

- The participant in the pair who did most math tasks correctly will for sure earn $20

**Question 3**

Which alternative is true if performance determines who in the pair earns $20?

- Both participants in the pair have the same chance to earn $20

- Both participants in the pair will only earn $0

- The participant in the pair who did most math tasks correctly will for sure earn $20

**SCREEN: PART 2**

**Part 2**

Part 2 will be about the distribution of earnings from part 1.

Remember that all participants who are here have been placed in pairs and that one person in the pair has received earnings of $20 from part 1 whereas the other person in the pair has received $0.

You have been matched to one of these pairs. Your task is to decide how this pair's total earnings from part 1 will be split between the two of them.

You will see several such situations where you have to make this decision. One of the situations that you will see is fact exactly what has happened to the pair. With 50 percent probability your decision in this situation will determine these participants' payoff from part 1 (with 50 percent probability it is determined by another participant, but it is never determined by anyone in the pair).

In the same way someone else in this room will determine how the total earnings in the pair in which you are one of the two people will be split between the two of you.

Please note that you will make the distribution decision for two other participants, i.e. NOT for yourself and the one you are paired with. In the same way, someone else will make the distribution decision for you and whoever you are paired with.

The decisions in part 2 are final, i.e they decide how earnings from part 1 will be split in the pairs and thus the payouts that the participants in the pair will receive from part 1.

We will now make sure that everyone has understood the instructions for part 2 correctly. When you have answered the questions below, please click the button at the bottom of the screen to proceed.

If any of your answers are incorrect, the computer will tell you so and you get to answer that question again.

**SCREEN: QUIZ 2**

**Question 1**
In part 2 you will be matched to two other participants. Who decides how their earnings are split between them?

- They decide together.

- One of them decides.

- I or another participant (but not one of them) decide.

**Question 2**
In part 2 you have also been matched with one other participant to form a pair. Who decides how your earnings are split between you?

- Another participant decides.

- I decide.

- The other person in the pair decides.

**SCREEN: POST-QUIZ 2 REMINDER**

Everyone has now completed the quiz.

You will soon make the decisions regarding the split of the earnings of two other players. Remember that your choices are NOT about your own payoffs but about the payoffs of two other people in this room.

Also, remember that it is always the case that it has been determined in one of two ways who in a pair earns $20 from part 1 and who earns $0:

1. By **luck**. In this case the participant who is lucky in a computerized coin toss earns $20 (and the other one earns 0).

2. By **performance.** In this case the participant who did most math tasks correctly earns $20 (and the other one earns 0).

In a particular scenario you may not know whether it was luck or performance that caused a participant to earn $20 or $0.

You will, however, be told the probability that performance determined the earnings.

**SCREEN: QUIZ 3**

We will now make sure that everyone has understood these additional instructions for part 2 correctly. When you have answered the question below, please click the button at the bottom of the screen to proceed.

If your answer is incorrect, the computer will tell you so and you get to answer the question again.

**Question 1**

Consider the following situation as an example: Person 1 earned $20 from part 1 and Person 2 earned $0.

You are told that with probability [x] percent, this was determined by performance (i.e. Person 1 performing better than Person 2) and with probability [100-x] percent, this was determined by luck.

Which alternative is true?

- The earnings were for sure determined by performance.

- There is some chance that the earnings were determined by performance, and some chance that they were determined by luck.

- The earnings were for sure determined by luck.

**SCREEN: POST QUIZ 3/REMINDER**

Everyone has now completed the quiz.

You will now make the decisions regarding the split of the earnings of two other players.

You will face several situations and one of them is the situation that has actually happened to the pair.

Remember that your choices are NOT about your own payoffs but about the payoffs of two other people in this room.

**SCREEN: DECISIONS (7 SCREENS)**

**Decision 1[2,3,4,5,6,7]**

<table>
<tr><td colspan="2">The probability that the outcome was determined by luck was [x]<br>The probability that the outcome was determined by performance was [x]</td></tr>
<tr><td>Person 1<br>Dollars earned: 0/20<br>How much do you want this person to earn?<br>[0-20]</td><td>Person 2<br>Dollars earned: 20/0<br>How much do you want this person to earn?<br>[0-20]</td></tr>
<tr><td colspan="2">Your input must sum to 20. Press “OK” when you have made your decision</td></tr>
</table>

**SCREEN: END OF PART 2**

Part 2 is now finished. The split of the earnings for all pairs, including yours, has been decided and is final.

You will be told what your earnings are at the end of the experiment.

**SCREEN: PART 3**

**Part 3**

We will now continue with part 3, which is the last part of the experiment.

In part 3 you will be asked nine questions. For each question you answer correctly, your payoffs from the experiment will increase with $0.5.

Your payoffs from part 3 only depends on whether you answer these questions correctly or not, not on what any other participant does.

Please press ok to proceed to part 3.

**SCREEN: PROBABILITY QUESTIONS (9 SCREENS)**

**Question 1[2,3,4,5,6,7,8,9]**

Imagine a lottery where there is a 10 [95,5,100,50,1,99,0,90] percent probability of winning a prize.

You buy 100 lottery tickets and give each of your 100 best facebook friends one lottery ticket.

Statistically speaking, how many of the 100 facebook friends would you expect to win a prize?

**SCREEN: PAYOFF SCREEN**

Your payoff from Part 1: x

Your partner`s payoff: x

Your payoff from part 3: x

Your total payoff from the experiment, including the showup fee (rounded up): x

*Experimental Instructions – Compound Uncertainty extension*

**SCREEN: WELCOME**

**Hi and welcome!**

You will see instructions on your screen and we will also read the instructions to you, so please follow along.

In this experiment you can earn money. The amount will depend on your decisions and the decisions of the other participants.

The experiment has several parts where you can earn money. Instructions will be given ahead of each part.

At the end of the experiment your total earnings will be added to the show-up fee of $5 and you will be paid in private, in cash before you leave.

The experiment is conducted anonymously, and you and all other participants will be identified only by code numbers. You can find your code number on the small piece of paper on your desk.

We will go through the instructions for part 1 now. If you have any questions after you have read and heard the instructions, please raise your hand.

Otherwise, no communication is permitted during the study. You are also not allowed to use mobile phones or other electronic devices. Please make sure that these are turned off and put away.

**SCREEN: PART 1**

**Part 1**

In part 1 of this experiment you will do math tasks consisting of adding numbers. In each task you will see five two-digit numbers. Your task is to add them up and provide the correct answer.

You have five minutes available to do as many of these tasks as you can. You are not allowed to use a calculator, but feel free to use the scrap paper that is available on your desk if you like.

Your performance in this part - how many tasks you did correctly - may influence how much you earn in this experiment. Doing more tasks will in that case always be better.

**SCREEN: MATH TASK**

**[math tasks]**

**SCREEN: END OF MATH TASK**

It has now been recorded how many math tasks you did correctly.

Please press ok to proceed.

**SCREEN: PAIRING**

**Pairs**

All of you who are in this room will be matched in pairs.

That means that you will be randomly and anonymously matched to another participant who is here.

You will not be told who the other participant is, and neither will the participant that you are paired with be told who you are.

**Earnings from part 1**

In each pair one participant will earn $20 and the other participant $0 for the work done in part 1. Who earns the higher earnings in a pair will be determined in one of the following two ways:

1. By **luck.** In this case the participant who is lucky in a computerized coin toss earns $20 (and the other one earns 0).

2. By **performance.** In this case the participant who did most math tasks correctly earns $20 (and the other one earns 0).

**SCREEN: QUIZ 1**

We will now make sure that everyone has understood the instructions for how the earnings are determined. When you have answered the questions below, please click the button at the bottom of the screen to proceed.

If any of your answers are incorrect, the computer will tell you so and you have to answer that question again.

**Question 1**

Which alternative is true?
- Both participants in each pair earn $10

- One participant in the pair earns $20, the other participant earns $0

- One participant in the pair earns $15, the other participant earns $55

**Question 2**

Which alternative is true if luck determines who in the pair earns $20?

- Both participants in the pair have the same chance to earn $20

- Both participants in the pair will only earn $0

- The participant in the pair who did most math tasks correctly will for sure earn $20

**Question 3**

Which alternative is true if performance determines who in the pair earns $20?

- Both participants in the pair have the same chance to earn $20

- Both participants in the pair will only earn $0

- The participant in the pair who did most math tasks correctly will for sure earn $20

**SCREEN: PART 2**

**Part 2**

Part 2 will be about the distribution of earnings from part 1.

Remember that all participants who are here have been placed in pairs and that one person in the pair has received earnings of $20 from part 1 whereas the other person in the pair has received $0.

You have been matched to one of these pairs. Your task is to decide how this pair's total earnings from part 1 will be split between the two of them.

You will see several such situations where you have to make this decision. One of the situations that you will see is fact exactly what has happened to the pair. With 50 percent probability your decision in this situation will determine these participants' payoff from part 1 (with 50 percent probability it is determined by another participant, but it is never determined by anyone in the pair).

In the same way someone else in this room will determine how the total earnings in the pair in which you are one of the two people will be split between the two of you.

Please note that you will make the distribution decision for two other participants, i.e. NOT for yourself and the one you are paired with. In the same way, someone else will make the distribution decision for you and whoever you are paired with.

The decisions in part 2 are final, i.e they decide how earnings from part 1 will be split in the pairs and thus the payouts that the participants in the pair will receive from part 1.

We will now make sure that everyone has understood the instructions for part 2 correctly. When you have answered the questions below, please click the button at the bottom of the screen to proceed.

If any of your answers are incorrect, the computer will tell you so and you get to answer that question again.

**SCREEN: QUIZ 2**

**Question 1**

In part 2 you will be matched to two other participants. Who decides how their earnings are split between them?

- They decide together.

- One of them decides.

- I or another participant (but not one of them) decide.

**Question 2**

In part 2 you have also been matched with one other participant to form a pair. Who decides how your earnings are split between you?

- Another participant decides.

- I decide.

- The other person in the pair decides.

**SCREEN: POST-QUIZ 2 REMINDER**

Everyone has now completed the quiz.

You will soon make the decisions regarding the split of the earnings of two other players. Remember that your choices are NOT about your own payoffs but about the payoffs of two other people in this room.

Also, remember that it is always the case that it has been determined in one of two ways who in a pair earns $20 from part 1 and  who earns $0:

1. By **luck**. In this case the participant who is lucky in a computerized coin toss earns $20 (and the other one earns 0).

2. By **performance.** In this case the participant who did most math tasks correctly earns $20 (and the other one earns 0).

In a particular scenario you may not know whether it was luck or performance that caused a participant to earn $20 or $0.In this experiment there are 7 different probabilities that the outcome was determined by performance: 0 percent, 1 percent, 10 percent, 50 percent, 90 percent, 99 percent or 100 percent.

For each pair there is an equal chance of either of these probabilities being used to determine the outcome.

**SCREEN: QUIZ 3**

We will now make sure that everyone has understood these additional instructions for part 2 correctly. When you have answered the question below, please click the button at the bottom of the screen to proceed.

If your answer is incorrect, the computer will tell you so and you get to answer the question again.

**Question 1 [control]**

Consider the following situation as an example: Person 1 earned $20 from part 1 and Person 2 earned $0.

You are told that with probability [x] percent, this was determined by performance (i.e. Person 1 performing better than Person 2) and with probability [100-x] percent, this was determined by luck.

Which alternative is true?

- The earnings were for sure determined by performance.

- There is some chance that the earnings were determined by performance, and some chance that they were determined by luck.

- The earnings were for sure determined by luck.

**Question 1 [treatment]**

Consider the following situation as an example: Person 1 earned $20 from part 1 and Person 2 earned $0.

You are told that this was determined by either performance or luck.

Which alternative is true?

- The earnings were for sure determined by performance.

- There is some chance that the earnings were determined by performance, and some chance that they were determined by luck.

- The earnings were for sure determined by luck.

**SCREEN: POST QUIZ 3/REMINDER**

Everyone has now completed the quiz.

You will now make the decisions regarding the split of the earnings of two other players.

You will face several situations and one of them is the situation that has actually happened to the pair.

Remember that your choices are NOT about your own payoffs but about the payoffs of two other people in this room.

**SCREEN: DECISIONS (7 SCREENS) [control treatment]**

**Decision 1[2,3,4,5,6,7]**

<table>
<tr><td colspan="2" align="center">The probability the outcome was determined by luck was [x]<br><br>The probability the outcome was determined by performance was [x]</td></tr>
<tr><td>Person 1<br><br>Dollars earned: 0/20<br><br>How much do you want this person to earn?<br><br>[0-20]</td><td>Person 2<br><br>Dollars earned: 20/0<br><br>How much do you want this person to earn?<br><br>[0-20]</td></tr>
<tr><td colspan="2">Your input must sum to 20. Press “OK” when you have made your decision</td></tr>
</table>

**SCREEN: DECISIONS (7 SCREENS) [Compound uncertainty treatment]**

**Decision 1[2,3,4,5,6,7]**

<table>
<tr><td colspan="2">The outcome was determined either by luck or performance.</td></tr>
<tr><td>Person 1<br>Dollars earned: 0/20<br>How much do you want this person to earn?<br>[0-20]</td><td>Person 2<br>Dollars earned: 20/0<br>How much do you want this person to earn?<br>[0-20]</td></tr>
<tr><td colspan="2">Your input must sum to 20. Press “OK” when you have made your decision</td></tr>
</table>

**SCREEN: END OF PART 2**

Part 2 is now finished. The split of the earnings for all pairs, including yours, has been decided and is final.

You will be told what your earnings are at the end of the experiment.

**SCREEN: PART 3**

**Part 3**

We will now continue with part 3, which is the last part of the experiment.

In part 3 you will be asked nine questions. For each question you answer correctly, your payoffs from the experiment will increase with $0.5.

Your payoffs from part 3 only depends on whether you answer these questions correctly or not, not on what any other participant does.

Please press ok to proceed to part 3.

**SCREEN: PROBABILITY QUESTIONS (9 SCREENS)**

**Question 1[2,3,4,5,6,7,8,9]**

Imagine a lottery where there is a 10 [95,5,100,50,1,99,0,90] percent probability of winning a prize.

You buy 100 lottery tickets and give each of your 100 best facebook friends one lottery ticket.

Statistically speaking, how many of the 100 facebook friends would you expect to win a prize?

**SCREEN: PAYOFF SCREEN**

Your payoff from Part 1: x

Your partner`s payoff: x

Your payoff from part 3: x

Your total payoff from the experiment, including the showup fee (rounded up): x

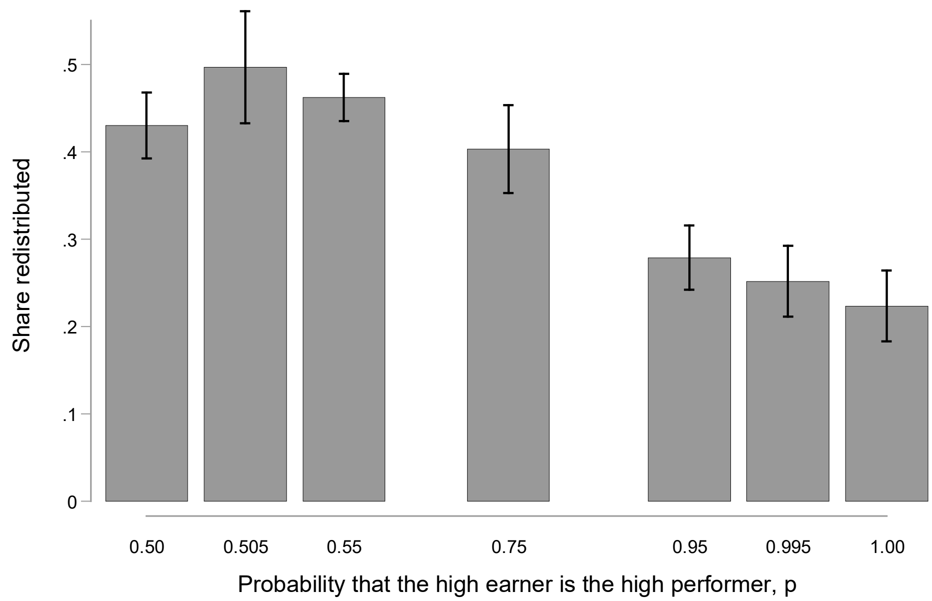
## Online Appendix B: Additional Analysis of the Laboratory Data

Here we provide some additional analysis referred to in the main text.

### *B1. Analysis of participants' first choice only*

We show here that the main results on aggregate behavior are robust to restricting the analysis to the first choice of each spectator.

***Figure B1: Share Redistributed for Different Values of p - Only First Choice***




*Notes: The figure provides an overview of the average share redistributed in each of the seven situations considered in the experiment when restricted to the first choice by each spectator (222 choices). It was randomly determined which situation was the first choice of each individual, and thus a comparison of any two shares in this figures provides a causal estimate of the effect of the corresponding change in p on share redistributed. Error bars indicate standard errors.*

*Table B1: Share Redistributed as a Function of p - Only First Choice*

| | (1)<br>Redist | (2)<br>Redist |
|---|---|---|
| $p$ | -0.458$^{***}$ | |
| | (0.0759) | |
| $p$ = 0.505 | | 0.0666 |
| | | (0.0634) |
| $p$ = 0.55 | | 0.0321 |
| | | (0.0614) |
| $p$ = 0.75 | | -0.0270 |
| | | (0.0614) |
| $p$ = 0.95 | | -0.151$^{*}$ |
| | | (0.0614) |
| $p$ = 0.995 | | -0.178$^{**}$ |
| | | (0.0628) |
| $p$ = 1.00 | | -0.206$^{***}$ |
| | | (0.0610) |
| Constant | 0.708$^{***}$ | 0.430$^{***}$ |
| | (0.0596) | (0.0444) |
| Observations | 222 | 222 |

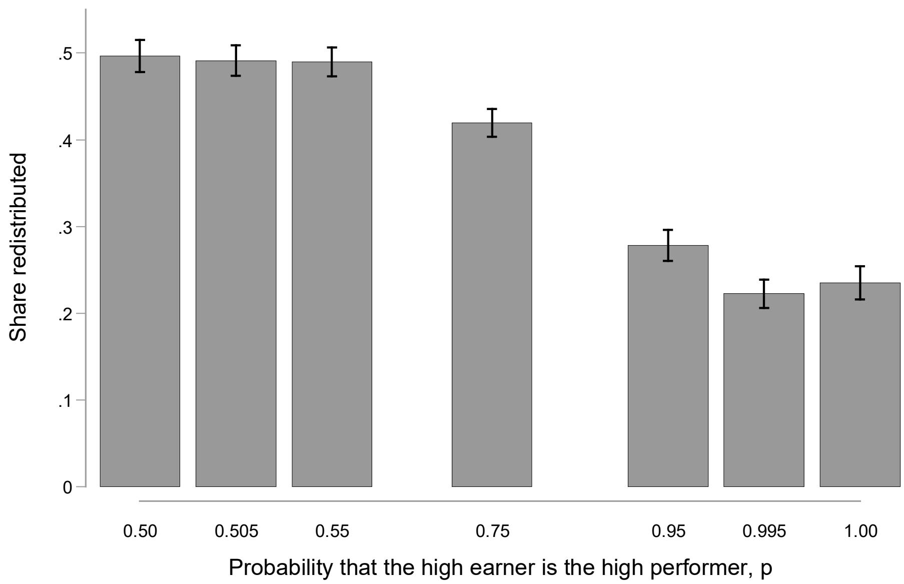
Standard errors in parentheses
$^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$

*Note: OLS regressions utilizing the first choice for each participant (n = 222). The dependent variable is the share that the spectators redistribute to the lower earner. Standard errors in parentheses. (1) shows the result from a model linear in p (the probability that the high earner was also the best performer), while (2) uses a dummy for each level of p. Omitted variable in specification (2) is p = 0.5. Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.1.*

*B2. Analysis excluding participants with limited statistical knowledge*

In Part 3 of the experiment, there were nine incentivized questions about the concept of probability (see online Appendix A for details). The analysis below includes only participants who answered eight or nine questions correctly, i.e., 35 participants with seven or fewer correct answers were excluded.

***Figure B2: Share Redistributed for Different Values of p – Excluding Participants with Limited Statistical Knowledge***




*Notes: The figure provides an overview of the average share redistributed in each of the seven situations considered in the experiment when excluding participants with limited statistical knowledge. Error bars indicate standard errors.*

***Table B2: Share Redistributed as a Function of p – Excluding Participants with Limited Statistical Knowledge***

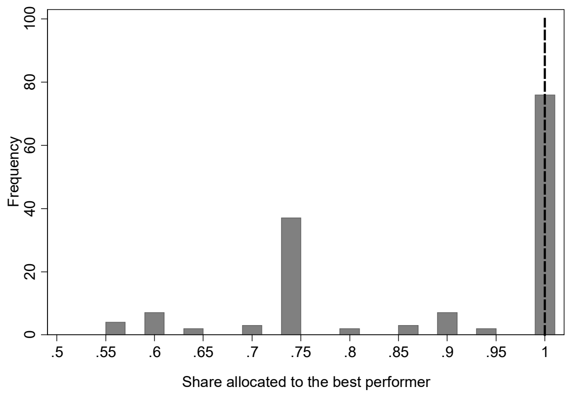
| | (1)<br>redist | (2)<br>redist |
|---|---|---|
| *p* | -0.534*** | |
| | (0.0421) | |
| *p* = 0.505 | | -0.00535 |
| | | (0.0166) |
| *p* = 0.55 | | -0.00668 |
| | | (0.0156) |
| *p* = 0.75 | | -0.0770*** |
| | | (0.0211) |
| *p* = 0.95 | | -0.218*** |
| | | (0.0235) |
| *p* = 0.995 | | -0.274*** |
| | | (0.0224) |
| *p* = 1.00 | | -0.261*** |
| | | (0.0241) |
| Constant | 0.777*** | 0.497*** |
| | (0.0329) | (0.0184) |
| Observations | 1309 | 1309 |

*Note: OLS regressions excluding participants with limited statistical knowledge (n = 187, i.e. 35 participants were excluded). The dependent variable is the share that the spectators redistribute to the lower earner. Standard errors (clustered at the level of individual spectators) in parentheses. (1) shows the result from a model linear in p (the probability that the high earner was also the best performer), while (2) uses a dummy for each level of p. Omitted variable in specification (2) is p = 0.5. Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.1.*

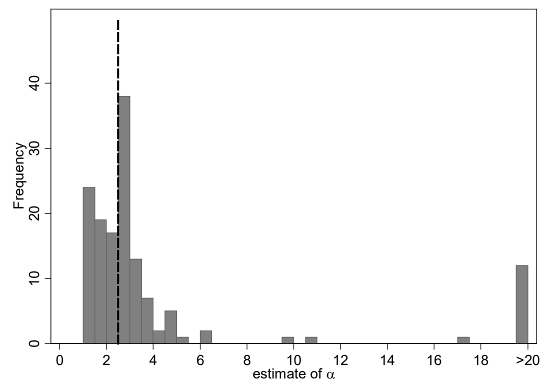
In Figure B3, we report the individual-level analysis. Among the participants with eight or nine correct answers in the statistical quiz (187 in total), there are 143 meritocrats who redistribute 47.8 percent (standard error = 2.22, median =50 percent) when p=0.5 and 12 percent (standard error = 1.20, median = 0) when p=1. The average share distributed to the high performer when $p$ is equal to one, $s_{BEST}^{FAIR}$, is 0.88. The median alpha is 2.5.

***Figure B3: Individual Calibrations for the Meritocrats – Excluding Participants with Limited Statistical Knowledge***

***Panel A: Distribution of $s^{FAIR}_{BEST}$***




***Panel B: Distribution of estimated $\alpha$***

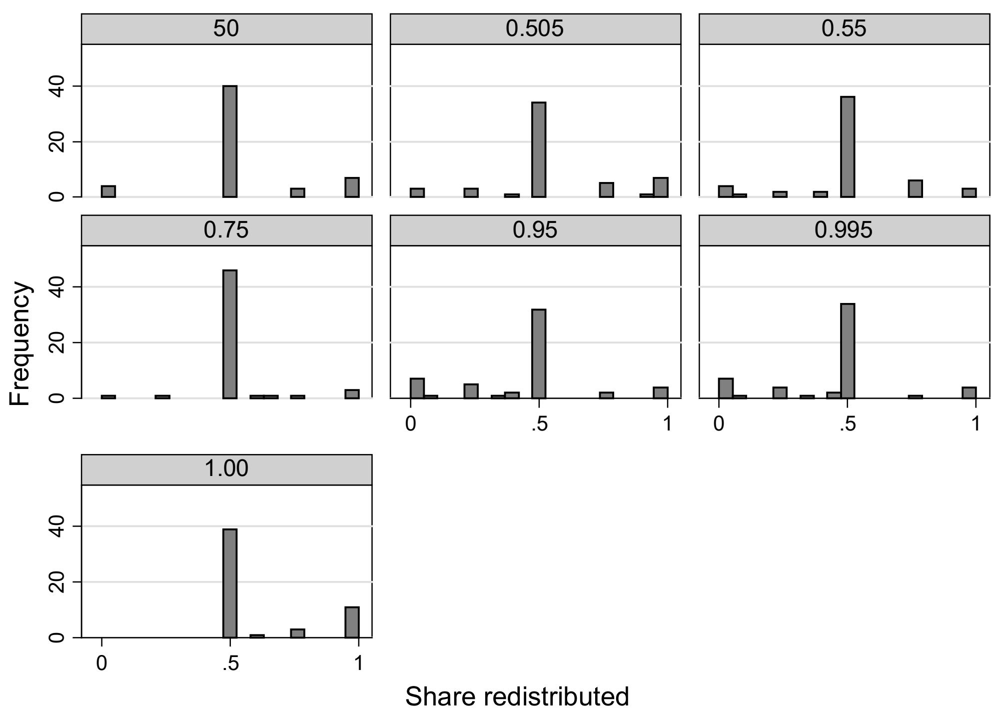



*Notes: The figures shows the distribution of share allocated to the best performer when p = 1 (Panel A) and the estimated α (Panel B) for meritocrats who correctly answered more than seven out of nine of the statistical questions in part 3 of the experiment. The dotted lines mark the medians of the respective distributions.*

### *B3. Analysis of individuals who are not meritocrats*

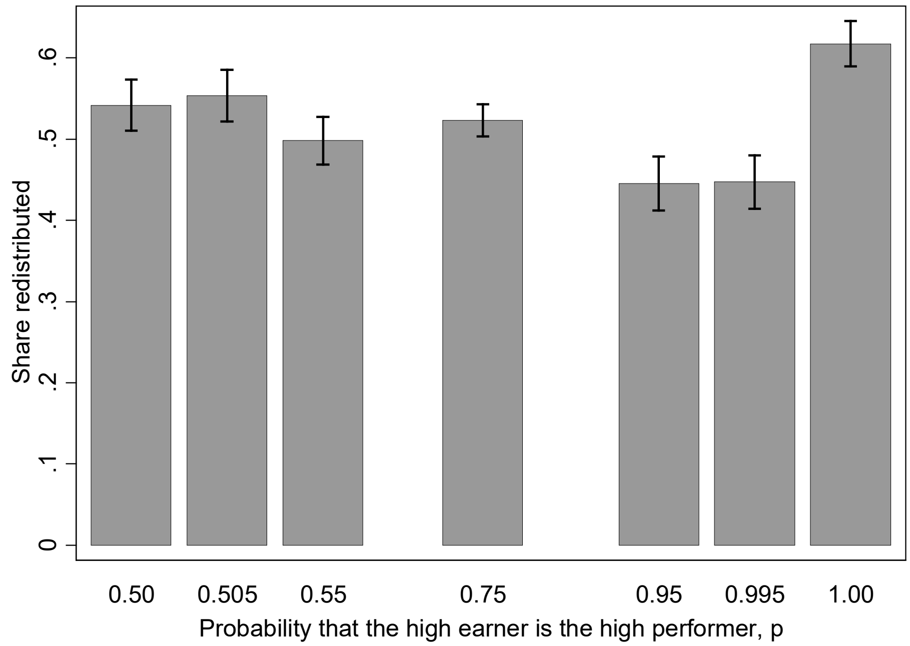
The main analysis focuses on the 168 individuals who are classified as meritocrats. Seven of the 168 meritocrats redistribute zero for all values of $p$. Theoretically, they may either be defined as strict libertarians (who never want to redistribute), or as meritocrats with $\alpha = 1$ (i.e. meritocrats who experience no egalitarian pull under uncertainty). In order to bias the analysis against our hypothesis of there being a significant and strong egalitarian pull to the behavior of meritocrats under uncertainty, these seven meritocrats are included in Panel B of Figure 3 as meritocrats with $\alpha = 1$. The value of the median $\alpha$ does not change if these seven spectators are instead classified as strict libertarians and not included among the meritocrats. Below we provide histograms and a comparison of the treatments for the remaining 54 individuals (24 out of these are strict egalitarians in the sense that they divide equally in all the seven situations).

***Figure B4: Histograms of Share Redistributed for Different Values of p – including only participants not classified as meritocrats***



*Notes: The histograms provide an overview of the share redistributed in each of the seven situations for the participants not classified as meritocrats.*

***Figure B5: Share Redistributed for Different Values of p – including only those not classified as meritocrats.***




*Notes: The figure provides an overview of the average share redistributed in each of the seven situations considered in the experiment when restricted to the participants not classified as meritocrats. Error bars indicate standard errors.*

### *B4. Analysis of the experimental extension*

We here provide some further analysis of the experimental extension.

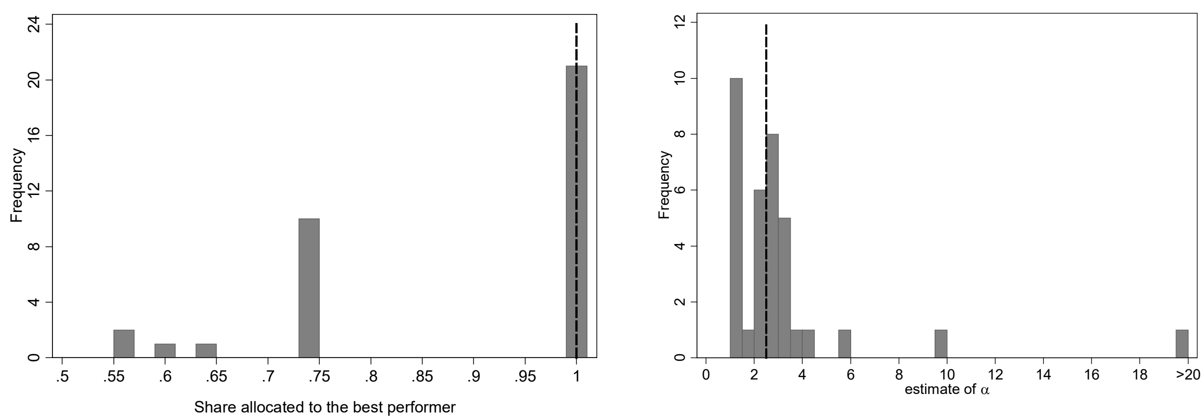
### *Table B3: Pairwise Comparisons of Mean Share Redistributed in the Main Experiment and in the Control Treatment in the Experimental Extension*

| ***Probability that the high earner is the high performer*** | ***p-value*** |
|---|---|
| *0.5* | *0.30* |
| *0.505* | *0.39* |
| *0.55* | *0.43* |
| *0.75* | *0.14* |
| *0.95* | *0.50* |
| *0.995* | *0.65* |
| *1* | *0.72* |

*Notes: The reported p-values are from t-tests evaluating the null (equal means) against an alternative that the means are not equal.*

### *Figure B6: Individual Calibrations for the Meritocrats in the control group of the experimental extension*

***Panel A: Distribution of*** $s_{BEST}^{FAIR}$ ***Panel B: Distribution of estimated*** $\alpha$




*Notes: The figure shows the distribution of the estimated* $\alpha$ *for the control treatment of the experimental extension. Data for all meritocratic spectators (N=25). The dotted lines mark the median (2.5).*

## Online Appendix C: Survey Materials

**Q: I have read and understood the above and want to participate in this study**

**Q: What is your current age?**

**Q: What is your gender?**

Male

Female

**Q: In which state do you live?**

**Q: What is your marital status?**

Single

Living with parents

Married/Partnership/Domestic partnership (without kids in the household)

Married/Partnership/Domestic partnership (with kids in the household)

Widow/widower

Other

Do not wish to answer

**Q: How many people live in your household?**

**Q: What is your household's ANNUAL income (before taxes)?**

Less than $24.999

$25.000 to $49.999

$50.000 to $99.999

$100.000 to $149.999

$150.000 or more

I do not wish to answer

**Q: Which political party do you more strongly identify with?**

Democrats

Republicans

Other

I don’t identify with a party

**Q: What is your highest level of completed education?**

Middle school

High school

University/college, 1-3/4 years (Bachelor’s/undergraduate degree)

University/college/graduate school, 4+ years (Master’s degree)

University/college/graduate school, 5+ years (Doctorate, professor degree)

Other

**Q We would like you to indicate to what extent you find it fair that the following factors determine a person's income. To what extent do you agree or disagree with the following statements:**

a) It is fair if **talent** determines a person's income.

b) It is fair if luck determines a person's income.

c) It is fair if hard work determines a person's income.

(Scale 0-10, from completely disagree to completely agree)

**Q: To what extent do you agree or disagree with the following statement:**

In society, it is typically the case that people with a higher income have done a better job than people with a lower income.

(Scale 0-10, from completely disagree to completely agree)

**Q: Consider a situation where Andrew and Bob were asked to do a job. They were told that the best performer would get a bonus of USD 200, and that the other would get zero. Assume that everyone (including yourself) agrees that this is fair.**

The problem is that there is uncertainty about who was the best performer. Suppose that you learn that it is more likely that Andrew did the best job. With 75 percent probability he was the best performer, and with 25 percent probability Bob was the best performer. Without knowing any more, how much of the USD 200 would you have given to Andrew and how much to Bob? The total has to equal 200.

**Q: When it comes to social issues, how liberal or conservative are you?**

(Scale 0-10, from very liberal to very conservative)

**Q: When it comes to economic issues, how liberal or conservative are you?**

(Scale 0-10, from very liberal to very conservative)

## Online Appendix D: Additional Analysis of Survey Data

We here provide a more detailed analysis of the survey data as referred to in the main text.

### *D1 Cross country analysis*

***Table D1: Cross Country Analysis of Share Given to Andrew***

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Norway | -0.058*** | -0.051*** | -0.051*** | -0.065*** |
| | (0.008) | (0.009) | (0.009) | (0.010) |
| Perceived p | | 0.004*** | 0.001 | 0.001 |
| | | (0.001) | (0.002) | (0.002) |
| Fair_work | | | 0.009*** | 0.008*** |
| | | | (0.002) | (0.002) |
| Fair_talent | | | 0.009*** | 0.008*** |
| | | | (0.002) | (0.002) |
| Fair_luck | | | -0.002 | -0.002 |
| | | | (0.002) | (0.002) |
| Additional controls | no | no | no | yes |
| N | 2020 | 2020 | 2020 | 1748 |

*Notes: Dependent variable is the share of the bonus given to Andrew (who with 75 percent likelihood was the best performer). All other definitions as in Table 2. Additional control variables: age, gender and household income (in USD)*

### *D2. Analysis of political differences*

Both among Republicans and Democrats in the US, and among the right and the left of center in Norway, it is considered most fair when income is determined by hard work. There is no significant difference between Republicans and Democrats (8.66 vs 8.52, $p=0.360$) but people on the right in Norway find it more fair to base income on hard work than people on the left (8.55 vs 8.21, $p<0.001$). Talent as a factor determining income is seen as significantly less fair, and $fair_{talent}<fair_{work}$ for all groups ($p<0.001$). Republicans find it more fair than Democrats do that income is based on talent (7.46 vs 6.92, $p<0.001$), and the same holds for the right-left comparison in Norway (6.31 vs 5.74, $p<0.001$). As for luck, Democrats find it unfair when it makes the base for income than republicans do (4.11 vs 4.61, $p<0.05$) and this also holds when comparing the right and left in Norway (2.52 and 1.91, $p<0.001$). These differences are not so large as to make the share of meritocrats different among Republicans and Democrats (68 and 65 percent respectively, $p=0.3679$) nor among the right and the left in Norway (82 and 80 percent, $p=0.1048$)

The extent to which a person finds income being informative of superior performance also varies with where on the political spectrum a person stands. Republicans find income more informative than Democrats (5.95 vs 5.05, $p<0.001$), as do those to the right of center in Norway compared to those left of center (3.92 vs 2.87, $p<0.001$). Finally, there is a difference between people in various parts of the political spectrum in how they react to uncertainty. In the question about Andrew and Bob, Republicans are significantly more likely to give the full reward to Andrew (26 percent of Republicans and 14 percent of the Democrats do that, $p<0.001$) as are the right of center in Norway (whereas 12 percent of the right of center give everything to Andew, only 7 percent of the left do the same, $p<0.001$). On average, Republicans give 73 percent to Andrew and Democrats give 68 percent ($p<0.001$). In Norway, those identifying with a right of center party give Andrew 66 percent, compared to those left of center who give 62 percent ($p<0.001$).

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