Discussion Paper Series – CRC TR 224

Discussion Paper No. 097
Project A 01

(Not) Everyone Can Be a Winner – The Role of Payoff Interdependence for Redistribution

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June 2019

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Funding by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) through CRC TR 224 is gratefully acknowledged.

(Not) Everyone Can Be a Winner – The Role of Payoff Interdependence for Redistribution*

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This version: May 29, 2019

Abstract

How does payoff interdependence affect preferences for redistribution? We experimentally implement a zero-sum setting and one in which everyone can be simultaneously successful. Across these, we compare redistribution given an identical level of inequality. First, two subjects' performances in a real-effort task translate into chances of winning a prize. Across treatments, we vary the interdependence of payoffs: either there is only a single prize or both subjects can potentially win a prize at the same time. Afterwards, a spectator can redistribute the prize money. If payoffs are not directly interdependent, the average amount redistributed decreases by 14-22%. In additional treatments, solely performance determines the prize allocation. Nevertheless, the impact of payoff interdependence remains unchanged. Comparing the settings with and without randomness, we find that its mere presence increases redistribution, even though there is no uncertainty about the (relative) performance of the two subjects.

Keywords: Redistribution, Social preferences, Fairness, Lab experiment
JEL-Classification: C91, D31, D63, H23

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1 Introduction

Inequality and its political responses have frequently been described as one of the defining challenges of the 21st century (e.g., World Economic Forum, 2017). Facing rising levels of wealth and income inequality (Atkinson, Piketty, and Saez, 2011; Keeley, 2015), political actors and institutions have to determine commonly accepted levels of redistribution. Implementing respective policy measures that are widely accepted requires a sound understanding of which allocations people consider fair. Hence, finding the underlying determinants of preferences for redistribution is crucial for designing corresponding institutions and mechanisms, and advancing our general knowledge of social preferences.[1]

How the environment affects the realization of inequality might constitute such a determinant in itself. If it is a zero-sum game, success always comes at the expense of others and payoffs are negatively correlated. If not, success is generally attainable for everyone simultaneously and inequality might still arise but is no longer guaranteed. To shed light on this channel, this paper investigates how different degrees of payoff interdependence shape the demand for redistribution. In particular, we contrast environments where individuals' payoffs are negatively correlated with those where such a correlation is absent.

For this purpose, we conduct a series of laboratory experiments that allow isolating the causal effect of payoff interdependence on preferences for redistribution. In all conditions, two workers work on a real-effort task and can gain a prize. The first set of treatments features randomness in the allocation process of prizes to workers. If payoffs are perfectly interdependent, workers compete for a single prize in a Tullock contest, whereby their relative performances determine their chances of receiving the prize. We remove this interdependence stepwise in two treatments. In the first step, we eliminate the interdependence in realized payoffs – one worker wins, the other looses – but keep the mutual impact of performances on others' expected payoffs identical. Prizes are now determined via two independent draws, one for each worker, whereby the two of them can both win a prize at the same time, only one might win, or even neither of them. As in the Tullock contest, relative performances determine a worker's chances of receiving a prize and hence expected payoffs are nonetheless negatively correlated. Therefore, in a second step, we implement a treatment where payoffs are entirely independent of each other: each worker still competes in a Tullock contest, but now individually against a randomly-drawn performance level, which is identical for both workers.

In a second series of experiments, we alter the allocation process to exclude the impact of randomness or luck on the workers' earnings. For the perfect interdependence of payoffs, this implies that the tournament becomes deterministic and the

[1] Chance and individual behavior have already been identified as key determinants of preferences for redistribution. Inequality is accepted if it is backed up by performance (Abeler et al., 2010) or individual decisions (Gantner, Güth, and Königstein, 2001; Cappelen, Hole, et al., 2007), but rejected if it is caused by luck (Croson and Konow, 2009; Cappelen, Konow, et al., 2013).

better-performing worker wins with certainty. Under complete independence, workers do not compete against each other but rather individually against a randomly-drawn threshold, which is the same for both workers.

In all treatments, a third participant – the spectator – knows the details of the procedure that generates the payoffs and observes the outcome as well as the individual performances. Afterwards, she can redistribute payoffs between the two workers as she sees fit. These redistribution decisions are our main variable of interest as we interpret them as a proxy for the underlying distributional preferences. Throughout the analysis of this paper, we focus on situations with inequality in payoffs, namely where only one worker receives a prize while the other worker ends up empty-handed.

In general, we observe two main characteristics of redistribution decisions if only one worker ends up with a prize: First, across all treatments spectators redistribute sizable shares of this prize to the other worker. Second, spectators allocate more earnings to the workers who work more, meaning that they condition their decisions on performance differences. Most importantly, and this is a novel contribution of our experiment, we find that redistribution decisions are affected by the interdependence of *realized* payoffs: (1) The redistributed share is even larger if – right from the start – only one worker can potentially win a prize. Put differently, spectators redistribute less if realized payoffs are not directly linked and two prizes are a priori attainable. (2) The interdependence of realized payoffs also affects how spectators respond to performance differences. If both workers can win simultaneously, performance differences matter less for redistribution decisions. (3) For both effects, it is not relevant whether chances of winning are still influenced by the other worker's performance or completely independent from one another. Thus, redistribution decisions are only affected by the interdependence of realized payoffs, namely whether in principle everyone can win simultaneously or not. Whether workers additionally influence each others' chances of winning and thereby their expected payoffs has no further impact on redistribution.

The above patterns prevail in settings in which a mix of luck and performance allocates prizes (first set of treatments), as well as in those that are deterministic (second set of treatments). However, the overall level of redistribution differs between these setting: when luck is part of the allocation process, spectators redistribute a higher share of the prize. This is independent of the interdependence of payoffs.

This observed impact of the interdependence of payoffs cannot be explained by theories on social preferences (e.g., Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000; Charness and Rabin, 2002) that incorporate fairness notions into the utility function, as these consider only inputs and outcomes, which we keep constant across our treatments.

Our findings contribute to the literature on fairness and redistribution in two distinct ways: First, to the best of our knowledge, we are the first to establish that inequality tends to be tolerated more willingly if it does not come directly at the expense of others. Second, we show that the mere presence of randomness or luck in the allocation process leads to higher demand for redistribution. Our findings therefore highlight a novel channel – the outcome-generating mechanism itself – that shapes redistributive preferences.

While this paper focuses on the interdependence of payoffs and hence the degree of how people's decisions and fortunes affect others, the overwhelming majority of the literature on redistribution concentrates on the individual accountability for own payoffs (e.g., Konow, 1996, 2000). Major differences in demand for redistribution emerge if inequalities arise due to luck compared with differences in individual decisions (Cappelen, Konow, et al., 2013), investment (Cappelen, Hole, et al., 2007), and effort (Fischbacher, Kairies, and Stefani, 2009). Inequality is accepted when it originates from differences in performance and investment (e.g., Almås, Cappelen, and Tungodden, forthcoming; Frohlich, Oppenheimer, and Kurki, 2004) and equality is even seen as unfair (Abeler et al., 2010). By contrast, third parties tend to eliminate inequalities between others once luck is involved in the payoff mechanism (e.g., Mollerstrom, Reme, and Sørensen, 2015; Breza, Kaur, and Shamdasani, 2017; Gee, Migueis, and Parsa, 2017; Rey-Biel, Sheremeta, and Uler, 2018).[2]

In the studies investigating the role of luck, it is unclear to the spectator whether the winner is the high-performing worker and whether her win was due to merit or luck. We eliminate any doubts about possible discrepancies by providing additional information about individual performances and hence only vary the presence of luck. Therefore we are able to causally demonstrate that a high demand for redistribution under luck is not solely a result of uncertainty about whether a high payoff was indeed merited or not. Unequal outcomes tend to be viewed as more unfair as soon as any luck is involved in their creation.

At the same time, the source of inequality becomes less important as long as people can be made (partially) responsible for their earnings, resulting in a higher acceptance of unequal incomes. Cappelen, Fest, et al. (2016) argue that even arbitrary decisions induce a sense of responsibility for resulting inequalities. In relation to our findings, their results indicate that spectators might hold high earners responsible for the low payoffs of others if payoffs are interdependent but not if the low earner could have won simultaneously. The importance of responsibility is further stressed by Bartling et al. (2018). Once people are given the opportunity to select into winner-take-all tournaments without randomness, the tournament's inequality is widely accepted. Our treatments without randomness support this finding. In addition, we document that the acceptance of inequality increases even further if the

[2] These papers treat the impact of performance and luck separately. We depart from this dichotomous view and allow both luck and performance to influence earnings at the same time. In a recent paper, Cappelen, Moene, et al. (2017) also investigate the interplay of merit and luck as determinants for redistribution. In contrast to our paper, a discernible part of individual payoffs is determined by luck and another part by performance. Spectators are unaware of the individual performances. The authors find that even if only a small part of the total inequality is based on merit, spectators redistribute similar amounts than in a case where all inequality is based on merit.

two parties were not competing against each other, but rather against an exogenous threshold.

While the quantitative measurements of the preferences for redistribution might be particular to the experimental parameters, we find that our qualitative results are in line with previous survey evidence. Respondents in the World Values Survey (Inglehart et al., 2014) who belief that wealth can only be accumulated at the costs of others are also more strongly in favor of a redistribution of incomes.[3] We take this as an indication that interdependence matters for preferences for redistribution not solely under the specific knowledge of the mechanism that generates individual earnings. A perception of the general environment as either strongly interrelated or not might already influence whether inequality is accepted or not, resulting in potentially different political institutions. For instance, using the World Values Survey, we find that people in the US have a significantly stronger belief in the independence of payoffs than those in all other developed countries.[4] Alesina and Angeletos (2005) document a correlation of social spending and redistribution with beliefs about the importance of luck and effort for wealth and income across countries. Our results indicate a complementary channel through which the perception of the societal environment and context might shape institutions. Finally, as discussed by Frank (2016) and Frank and Cook (1996), technological change and the increasing prominence of bonus schemes make winner-take-all and zero-sum situations more common in everyday life. This development might contribute to a raised sense of unfairness, beyond the actual level of earnings inequality.

In this respect, our findings should not only matter in the abstract sense of beliefs about the interdependence of earnings and optimal levels of redistribution within society, but they might even be relevant for the optimal setting of wages within firms. Forced rankings by supervisors, promotion tournaments, and fixed bonus pools always imply that one employee succeeds at the cost of others. These strategies are frequently employed as they allow principals to set incentives if effort is not verifiable (Rajan and Reichelstein, 2006). On the flip side, such incentive schemes could constitute an important source of discontent and envy within the firm. In turn, this might explain the ambiguous effect of forced ranking schemes on individual performance observed by Berger, Harbring, and Sliwka (2013). In the long run, interdependent payoffs might harm employees' willingness to exert effort in the first place. By contrast, employees might be willing to accept unequal pay within a division or firm more eagerly if advanced positions are not exogenously limited and bonus pools are not fixed. In turn, this would allow firms to set steeper incentives or even reduce overall payment.

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[3] The exact wording of the questions is "incomes should be made more equal" vs. "we need larger income differences as incentives for individual effort", and "people can only get rich at the expense of others" vs. "wealth can grow so there's enough for everyone". We find a correlation of $\rho = 0.13$, $p < 0.0001$ between the answers to the two questions.

[4] Figure A.1 in the Appendix presents the mean beliefs in the interdependence of payoffs in the western countries.

The remainder of this paper is structured as follows. Section 2 presents the design of the laboratory experiment, before Section 3 shows the results. Finally, Section 4 discusses and concludes.

2 Design

In natural environments, the multitude of factors determining income and wealth as well as the ignorance about the specific relationship between performance, luck and outcomes makes it very difficult to identify the causal impact of the specific context on demand for redistribution. We therefore use the controlled environment of a lab experiment to investigate how preferences for redistribution are affected by the interdependence of payoffs.

Our design is based on a two-stage experiment – previously used, for example, by Cappelen, Konow, et al. (2013) – which features two types of subjects: workers and spectators. In the first stage of the experiment, workers have the opportunity to gain a prize. They are grouped in pairs and can work on a real-effort task to increase their likelihood of winning a prize. Subsequently, the winner(s) of the prize are determined, whereby the payoff-generating mechanism is varied between treatments. In the second stage, each spectator observes performances and earning distributions of one pair and is able to redistribute earnings between these two workers. Roles and treatments are assigned at random.

2.1 Workers

At the beginning of the experiment, workers are informed that they are matched with another worker and that they have the opportunity to gain a prize of €6. However, they are also told that another participant can redistribute any earnings between the two workers ex post. Workers perform a real-effort task (repositioning sliders, based on Gill and Prowse, 2012). On every screen, subjects have to adjust five sliders ranging from 0 to 100 to the mid-position (50). Each screen with five sliders counts as a single task. Workers can spend up to twelve minutes completing as many tasks as they like. This part of the experiment is conducted online.

The number of completed tasks is used to determine whether a worker is awarded a prize or not. Across treatments, we vary how earnings are realized. In principle, a higher performance increases the likelihood of earning a prize. While workers are informed about the outcome-generating process, they do not receive any information about the actual distribution of prizes at this point. They are only informed that a third subject – the spectator – observes performances and earnings and can redistribute any amount between the two workers. Only after spectators' decisions are implemented do the workers receive information about their performances and final payoffs.

Table 1. Treatment overview

Treatment	# potential prizes	Interdependence of payoffs	Featuring randomness
Randomness - Full Competition (R-FC)	1	Yes expected & realized	Yes
Randomness - Chance Competition (R-CC)	2	Yes expected	Yes
Randomness - No Competition (R-NC)	2	No	Yes
Deterministic - Full Competition (D-FC)	1	Yes expected & realized	No
Deterministic - No Competition (D-NC)	2	No	No

2.2 Spectators

In the second stage, a third subject – acting as a spectator – can redistribute money within pairs of workers. For this purpose, spectators are introduced to the real-effort task and have to test it for themselves for one minute. Prior to making their decision, the spectators observe performances and current earnings of each worker.[5] Subsequently, they are asked to redistribute any amount of the prize(s) between the two workers in steps of €1. These options are presented as income distributions for workers A and B, respectively, and workers are paid according to the chosen distribution.

Each spectator can redistribute earnings between multiple pairs of workers. We use a variant of the strategy method (as used, e.g., in Kube and Traxler, 2011) to collect choices of redistribution across multiple conditions. We present subjects with a portfolio of combinations of performances and winner(s), and inform them that only one combination represents a real pair of participants, whereas the remaining pairs are hypothetical.[6] The selected performances and the treatments in which they are used are displayed in Table 2. Subjects only learn the true pair after their decisions and are unable to identify this pair.[7] This method enables us to hold performances and earning distributions constant and exogenous across participants and treatments.

2.3 Treatments

As already outlined above, workers exercise a real-effort task and performance in this task influences expected and realized payoffs. The exact mapping of performance to payoffs is varied across treatments in two dimensions. The first variation

[5] Whenever only one prize is allocated, we label worker A as the winner of that prize.
[6] The order of the pairs is randomized between subjects.
[7] We ask subjects to guess the true pair in an incentivized ex post question and only 12 out of 200 (6%) subjects state a correct guess.

involves the degree of payoff interdependence. Moreover, we vary whether randomness is involved, that is whether the worker with the lower performance has a positive chance of winning a prize. We provide an overview of all treatments in Table 1.

Our first three treatments involve randomness in the payoff allocation and vary in their degree of payoff interdependence. All of these treatments are framed as a lottery. The completion of one task produces one lottery ticket which is thrown into an urn. The number of urns and the composition of tickets represents the treatment variation.

In the baseline treatment *Randomness - Full Competition (R-FC)*, both workers compete for a single prize in a Tullock contest (e.g., Tullock, 2001). Accordingly, both workers put all of their tickets into a single urn, whereby one ticket is randomly drawn to determine the winner of the contest. In this setting, subjects compete in ex ante payoffs, namely in expected payoffs and chances. In addition, they compete in ex post payoffs, since exactly one prize is handed out and consequently the earnings of one worker automatically determine those of the second one.

We remove these interdependencies in two steps. First, we introduce independence of realized payoffs in treatment *Randomness - Chance Competition (R-CC)*. Before one ticket is drawn from the urn containing the tickets of both workers, the urn is duplicated. Subsequently, for each worker an independent draw is executed. If the corresponding draw of worker A produces a ticket of worker A, she gains a prize. The same is true for the draw from worker B's urn: if a ticket of worker B is drawn, B receives a prize. Consequently, it is now possible that in addition to one winner, both can win a prize simultaneously, or neither of them. Importantly, compared with *R-FC*, neither the expected payoffs nor the impact of worker A on worker B's chances (and vice versa) change. Relative performance still determines a worker's likelihood of winning a prize.

Treatment *Randomness - No Competition (R-NC)* additionally removes this interdependence of expected payoffs. Each worker has her own urn, containing only her own earned tickets. Moreover, an identical number of blanks is added to each urn. The number of blanks is randomly drawn from a predetermined set.[8] This implies that the performance of one worker no longer has any influence on the chances of success for the other worker, whereby both workers' income is determined completely independent from one another.

In addition, we conduct two further treatments that correspond to *R-FC* and *R-NC* but eliminate any randomness in the allocation of the prize. In treatment *Deterministic - Full Competition (D-FC)*, two workers compete for a single prize, which is allocated to the better-performing worker with certainty.[9] In the second condition, *Deterministic - No Competition (D-NC)*, each worker receives a prize if she exceeds a randomly-drawn threshold, so either both, one or neither worker receives a prize. As

[8] In turn, this is based on previously observed performances by unrelated workers.
[9] If both workers have the same performance, the winner is randomly determined.

Table 2. Hypothetical pairs and their occurrence in treatments

situation	winner	perf. A	perf. B	random number	R-FC	R-CC	R-NC	D-FC	D-NC
1	A	54	54	51	X	X	X	X	-
2	A	35	32	33	X	X	X	X	X
3	A	56	59	58	X	X	X	-	-
4	A	63	31	49	X	X	X	X	X
5	A	39	54	45	X	X	X	-	-
6	A	44	46	37	X	X	X	-	-
7	A	45	55	26	X	X	X	-	-
8	A	30	51	57	X	X	X	-	-
9	A	68	63	65	X	X	-	X	X
10	A	24	28	-	X	X	-	-	-
11	A	72	58	69	X	X	-	X	X
12	A	37	37	-	X	X	-	X	-
13	A&B	61	61	63	-	X	X	-	-
14	A&B	38	35	36/28	-	X	X	-	X
15	A&B	69	29	45/16	-	X	X	-	X
16	A&B	47	64	51/27	-	X	X	-	X
17	A&B	33	33	30	-	X	-	-	X
18	A&B	58	54	-	-	X	-	-	-
19	A	67	67	45	-	-	X	-	-
20	A	66	73	55	-	-	X	-	-
21	A	42	37	50	-	-	X	-	-
22	A&B	49	49	32	-	-	X	-	X
23	A&B	41	37	53	-	-	X	-	-
24	A	46	44	-	-	-	-	X	-
25	A	55	45	48	-	-	-	X	X
26	A	51	30	34	-	-	-	X	X
27	A&B	46	44	37	-	-	-	-	X

Notes: "X" denotes that the situation is featured in the treatment whereas "-" indicates that it is not. Random number indicates the randomly drawn threshold for the *No Competition* treatments. For decisions 14 to 16, the first number corresponds to *R-NC*, and the second number to *D-NC*.

before, the threshold corresponds to the performance of a third uninvolved worker and is identical for both workers.

2.4 Procedures

The experiment was conducted with subjects from the subject pool of the Bonn-EconLab between April and June 2018. Students were recruited using hroot (Bock, Baetge, and Nicklisch, 2014) and both stages were computerized via oTree (Chen, Schonger, and Wickens, 2016). The first stage of the experiment was conducted online. Subjects were told that they could only participate in the experiment by using a desktop computer or laptop, but not a mobile device. In addition, the subjects filled in a short questionnaire. This part of the study lasted about 20 minutes and subjects earned on average €4.25, including a show-up fee of €1. Spectators were invited to the BonnEconLab to make their redistribution decisions. Spectators received a flat fee of €8 for their participation. They could earn an additional amount of €1 by correctly guessing the non-hypothetical pair of workers once they had made all redistribution decisions. After finishing the redistribution decisions, subjects answered a questionnaire containing locus of control (Rotter, 1966), questions regarding social inequality (Scholz, Heller, and Jutz, 2011) and sociodemographics. The second stage took about 40 minutes and subjects earned on average €8.05.

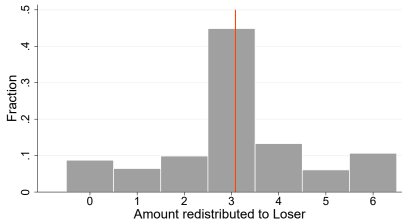
Participants were assigned to treatments at random. Hence, the sizes of treatments slightly vary, whereby each treatment features between 39 and 43 spectators. For each spectator making a decision, a pair of workers was required to generate the underlying performance and earning distribution. Including all treatments, 200 spectators and 400 workers participated overall.

3 Results

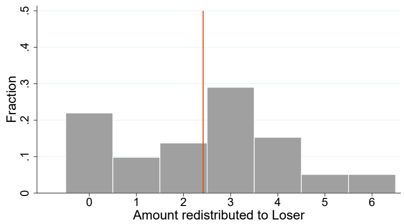
Our experimental design allows to study the causal effect of the interdependence of payoffs on preferences for redistribution. The three main treatments, analyzed in Section 3.1, feature three contexts that vary the interdependence of two workers' earnings. More specifically, they correspond to a winner-take-all contest (*R-FC*), a contest that determines individual expected payoffs (*R-CC*) and two individual, independent contests against a randomly-determined performance level (*R-NC*). After presenting the results from these treatments, we support our evidence in Section 3.2 with a second set of treatments that remove any randomness in the prize allocation process, but still vary between full competition (*D-FC*) and no competition (*D-NC*). Finally, concluding our analysis in Section 3.3, we use the treatments with full and without any competition to identify the impact of randomness per se.

Throughout the entire analysis we always focus first on the redistribution behavior in those situations that are featured in all analyzed treatments (see Table 2). Accordingly, subjects observe exactly the same combinations of work performances and resulting earnings allocations. In a second step, we include those situations that are not featured in all treatments (including the actual worker pairs). Due to the differing performance levels, they are not comparable one-to-one; rather, we control for the different performance levels and study their impact for each treatment separately. As we are interested in responses to inequality, we focus on those situations where only one worker wins a prize and spectators face unequal earnings.[10] Throughout this section, we look at how much of the €6 prize the spectators redistribute to the loser.

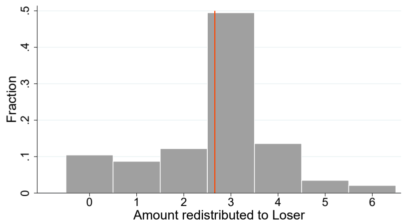
[10] Equal earnings cannot arise in *Full Competition*. Naturally, other tournament outcomes are possible in treatments *Chance Competition* and *No Competition*. Corresponding situations are shown to the spectators, see Table 2 for the situations with two winners. However, these situations are markedly different. If both workers win, the total sum of earnings is doubled. Redistribution decisions for these situations are analyzed in Appendix C. We observe only little redistribution and no treatment differences in these situations. If no worker receives a prize, redistributing the prize money is impossible.



(a) Randomness - Full Competition



(b) Randomness - Chance Competition



(c) Randomness - No Competition

Figure 1. Amount redistributed to the loser for treatments with randomness

Notes: The figure presents the histograms of the money transferred to the loser for the three main treatments. The vertical red lines indicate the mean level of money transferred. The figures include only transfers for those situations that were featured in all three treatments.

3.1 The effect of payoff interdependence on redistribution

Figure 1 illustrates our main result, displaying histograms of redistribution decisions for those situations 1 to 8 that are featured in all three *Randomness* treatments. Under full competition (*R-FC*), spectators redistribute €3.08 to the loser on average. In slightly less than half of all situations (44.5%), spectators choose to equalize earnings between the two workers. Once the realized payoffs are no longer directly interrelated, spectators redistribute less. The average amount redistributed to the loser drops to €2.42 (*R-CC*) and €2.66 (*R-NC*), respectively. Figure 1 already reveals that the reduction has different sources. In *R-CC*, in only 29% of the decisions are earnings equalized and in 22% of all cases is nothing transferred to the loser at all. By contrast, without any competition at all, close to half of the decisions (49.5%) result in equal shares. In treatment *R-NC*, spectators less often redistribute in such a way that the loser receives more than €3.

We present the estimates from the corresponding regression analyses in Table 3. Column (1) includes only situations 1 to 8 that are featured in all three treatments. Removing the direct interdependence of realized payoffs but keeping the competition in chances (*R-CC*) lowers the transfer to the loser by €0.67. In the absence of any competition (*R-NC*), the coefficient is −0.43 and thus somewhat smaller in size, but does not significantly differ from *R-CC*. These treatment effects are robust once

Table 3. Impact of payoff interdependence on redistribution for treatments with randomness

	Amount redistributed to Loser		
	(1)	(2)	(3)
Chance Competition	-0.668***	-0.563**	-0.617***
	(0.231)	(0.225)	(0.231)
No Competition	-0.425**	-0.281*	-0.310*
	(0.188)	(0.168)	(0.170)
Performance Winner (cent.)		-0.002	-0.002
		(0.002)	(0.002)
Δ Performance		-0.041***	-0.054***
		(0.004)	(0.008)
Chance Competition × Δ Performance			0.024**
			(0.011)
No Competition × Δ Performance			0.016*
			(0.009)
Constant	3.084***	2.949***	2.979***
	(0.136)	(0.122)	(0.124)
N	805	1326	1326
R^2	.03	.18	.19
p-value: CC vs. NC	.29	.21	.37
Avg. Redistribution	2.7	2.6	2.6

Notes: This table presents OLS regressions using the money redistributed to the loser as the dependent variable. *, **, and *** denote significance at the 10, 5, and 1 percent level, respectively. Standard errors are displayed in parentheses and clustered at the participant level. Performance is centered on the average performance of those situations, that are featured in all three treatments, see Table 2. Δ Performance is the difference between the performance of the winner and the loser. CC vs. NC tests the difference of treatments *R-CC* and *R-NC* in columns (2) and (3). Column (4) shows a joint test of the treatment effect and interaction effect with the performance difference.

we control for the winning performance[11], as well as the performance difference between the winner and loser, and include all decisions in which only one worker receives a prize (column (2)). This column highlights that spectators tend not to condition their redistribution decision on the absolute performance level; rather, they strongly respond to the performance differences between the two workers. In *Full Competition*, if both workers perform equally, the predicted transfer is very close to the equal split (€2.95). *Ceteris paribus*, an additional performance difference of ten tasks leads to a reduction of €0.4 in the transfer to the loser. Symmetrically, a higher performance of ten tasks by the loser is also associated with a €0.4 increase in transfer to the loser.

[11] The performance of the winner is centered around the mean performance in situations 1 to 8. This means that the constant represents the amount redistributed in *Full Competition* if both workers have an average performance and the main effects (col(1)) are also evaluated at this mean.

Notably, the impact of performance differences changes across treatments (column (3)): if the interdependence in realized payoffs is removed, the impact of the workers' performance differences is significantly muted; spectators reaction to a ten-task change in the performance difference drops from €0.5 to €0.3.

In summary, the absence of interdependence in realized payoffs affects redistribution behavior in two separate ways. First, if high earnings for one person prohibit high earnings for another, inequality is accepted significantly less compared with a situation in which both can win simultaneously. Second, without this interdependence, redistribution decisions react less to individuals' performance differences. Hence, inequality that is not backed up by performance is more frequently accepted.

3.2 Payoff interdependence in a deterministic setup

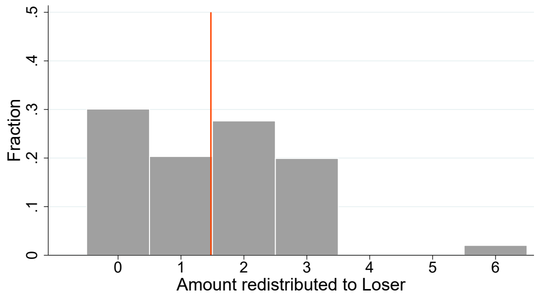
We support our results with a second set of treatments. Here, we again vary the degree of payoff interdependence between full competition (*D-FC*) and no competition (*D-NC*) but eliminate the impact of randomness. This means that under full competition the better-performing worker wins with certainty and in the absence of competition the workers receive a prize if their performance exceeds a randomly-drawn threshold. This also implies that the lower-performing worker can never receive the prize at the expense of the better-performing one. We therefore expect a lower baseline level of redistribution.

Figure 2 displays redistribution decisions for both treatments.[12] If the two workers are directly competing against each other, the spectators transfer €1.48 to the loser on average. This is much lower than in the previously presented treatments, which involve randomness. Unsurprisingly, almost no spectator transfers more than half of the prize to the loser; rather, 30% do not redistribute at all, while 20% choose to equalize earnings. Once the two workers no longer compete against each other but against the same threshold, the average transfer is reduced by 20.2% to €1.18. While earnings are rarely equalized (11.2%), more than one-third choose to transfer nothing.

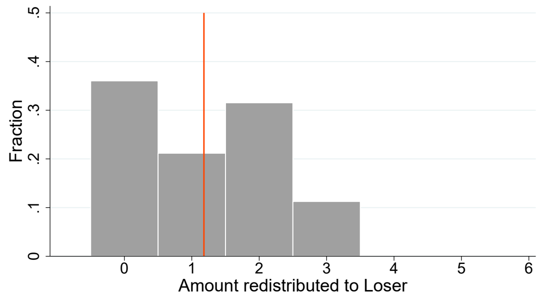
The corresponding estimations are presented in Table 4. Equivalent to Table 3, column (1) includes only directly comparable situations that are featured in both treatments. While this estimation indicates that under no competition redistribution is reduced by €0.30, this effect is not significant. However, once we include all situations with one winner and control for the performance level of the winner[13] and performance difference (column (2)), we find a significant effect of payoff interdependence on inequality acceptance. Again, performance difference has a significant impact and the estimated coefficients are close to those estimated for the treatments including randomness. Column (3) allows the impact of performance to differ by treatment. Reassuringly, we find the same pattern as above: the reaction to the size

[12] These are situations 2, 4, 9, 11, 25, and 26 of Table 2.

[13] The performance of the winner is centered around the mean performance in situations that are featured in both treatments.



(a) Deterministic - Full Competition



(b) Deterministic - No Competition

Figure 2. Amount redistributed to the loser for deterministic treatments

Notes: The figure presents the histogram of the money transferred to the loser for the two deterministic treatments. The vertical red lines indicate the mean level of money transferred. The figures include only transfers for those decisions that were featured both treatments.

of the difference between the tasks the workers solve is significantly lower once the payoffs are not directly related.

In summary, the results of our second set of treatments support our findings: even without any randomness in the allocation process, the direct interdependence of payoffs causes spectators to accept inequality in payoffs less and prompts them to react more strongly to the workers' performances.

3.3 The role of randomness for redistribution

In addition to investigating the effect of payoff interdependence, our design allows to identify the causal impact of the pure presence of randomness in a prize allocation process on the demand for redistribution. In previous studies, the involvement of luck has implied uncertainty about the performance rank of the winner of the contest. In our design, since the spectators are fully informed about the workers' performances, they know for sure whether the high-performing subject wins the prize. In particular, we can compare tournament situations where the higher-performing worker always wins with certainty with those in which a lower-performing worker can win in principle. Here, we consider only those situations where the higher-performing worker wins. Hence, in these cases the tournaments

Table 4. Impact of payoff interdependence on redistribution for deterministic treatments

	Amount redistributed to Loser		
	(1)	(2)	(3)
No Competition	-0.295	-0.410**	-0.612***
	(0.211)	(0.197)	(0.225)
Performance Winner (cent.)		-0.004**	-0.004*
		(0.002)	(0.002)
Δ Performance		-0.044***	-0.049***
		(0.003)	(0.004)
No Competition × Δ Performance			0.015**
			(0.006)
Constant	1.476***	2.261***	2.318***
	(0.171)	(0.147)	(0.148)
N	468	644	644
R^2	.015	.23	.23
Avg. Redistribution	1.3	1.5	1.5

Notes: This table presents OLS regressions using the money redistributed to the loser as the dependent variable. *, **, and *** denote significance at the 10, 5, and 1 percent level, respectively. Standard errors are displayed in parentheses and clustered at the participant level. Performance is centered on the average performance of those situations that are featured in both treatments, see Table 2. Δ Performance is the difference between the performance of the winner and the loser.

are outcome-equivalent, whereby from an ex post perspective randomness makes no difference on the prize allocation.[14]

Table 5 displays our results. Column (1) includes only the decisions made for situations 2 and 4 from Table 2, as they are the only situations featured in all four treatments. If performances and the resulting payoffs are kept entirely constant, randomness in the allocation process increases the amount redistributed to the low-performing worker by €0.61, marking an 46% increase compared with the treatments without randomness. As in the previous sections, the remaining columns include further decisions that are not entirely identical between treatments but control for the performances of the workers. Columns (2) and (3) conduct the analysis separately for the treatments with full competition (*FC*) and without any competition (*NC*), respectively. Column (4) pools all treatments, controlling for the interdependence of payoffs. All specifications show a significant positive impact of the presence of randomness on the amount transferred to the loser. Finally, column (5) reveals that the impact of the workers' performance differences does not differ between the treatments that feature randomness and those that do not.

[14] We compare *R-FC* and *R-NC* with the two equivalent deterministic treatments. Naturally, there cannot be a counterpart for competition in chances without the presence of randomness. Hence, treatment *R-CC* is dropped from the subsequent analysis.

Table 5. Impact of randomness without uncertainty on redistribution

	Amount redistributed to Loser				
	(1) FC & NC	(2) FC	(3) NC	(4) FC & NC	(5) FC & NC
Randomness	0.614***	0.410**	0.911***	0.588***	0.516***
	(0.161)	(0.202)	(0.177)	(0.140)	(0.151)
Performance Winner (cent.)		-0.006***	0.004	-0.003	-0.003
		(0.002)	(0.003)	(0.002)	(0.002)
Δ Performance		-0.043***	-0.037***	-0.042***	-0.048***
		(0.004)	(0.004)	(0.003)	(0.004)
No Competition				-0.228*	-0.289*
				(0.135)	(0.147)
Randomness × Δ Performance					0.007
					(0.005)
No Competition × Δ Performance					0.006
					(0.005)
Constant	1.314***	2.269***	1.684***	2.171***	2.235***
	(0.114)	(0.149)	(0.149)	(0.132)	(0.132)
N	322	677	460	1137	1137
R^2	.055	.2	.32	.24	.24
Avg. Redistribution	1.6	1.9	1.7	1.8	1.8

Notes: This table presents OLS regressions using the money redistributed to the loser as the dependent variable. *, **, and *** denote significance at the 10, 5, and 1 percent level, respectively. Standard errors are displayed in parentheses and clustered at the participant level. Performance is centered on the average performance of the featured treatments. Δ Performance is the difference between the performance of the winner and the loser.

In summary, randomness influences inequality acceptance beyond making it more difficult to discern whether the inequality is based on merit or performance. Rather, the mere presence of randomness in an allocation process – allowing the low-performing individual a chance of success – makes spectators redistribute more, independent of the payoff interdependence. This suggests that in situations involving randomness, subjects not only equalize incomes out of the fear of harming the high-performing people but also act to acknowledge the unfortunate ones' ex ante chance of success.

4 Conclusion

In this paper, we experimentally provide evidence that more inequality is accepted when payoffs are not interdependent. When two individuals compete for one high outcome, on average 25% to 50% of the prize is redistributed to the losing person ending up with the low outcome. Removing the interdependence of realized payoffs, namely allowing both persons to win simultaneously, reduces redistribution by 14% to 22%. Whether chances of winning are totally independent between persons or an interdependence in expected payoffs still exists has no additional impact on the demand for redistribution. This holds true for situations with and without randomness being present in the allocation process.

In general, we interpret our findings such that people do not solely focus on realized states; rather, they seem to take all states into account that are possible ex ante, irrespective of their actual realization. Accordingly, once payoffs are not totally interdependent, spectators seem to include the possibility that both workers could have won simultaneously in their redistribution decisions. By contrast, whenever only one worker can win at a time, this high income is perceived as being taken away from the loser. This is inconsistent with any existing theoretical model of social preferences (e.g., Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000; Charness and Rabin, 2002). These models solely consider inputs and outcomes but do not regard the underlying payoff-generating mechanisms and hence do not incorporate the interdependence of payoffs into the utility functions. The tendency to include unrealized states into one's future decision-making therefore hints at a broader behavioral mechanism that is currently missing in the theoretical literature on social preferences.

In summary, this paper highlights a novel source for fairness views and demand for redistribution. The perception of the state of the economy – whether growth exists or wealth is only possible at the expense of others – potentially affects political attitudes towards redistribution. Thus, informing people about the actual interdependence of payoffs can also have major consequences for these attitudes. Employers and supervisors might also be interested to include the effect of payoff interdependence on fairness perception in wage-setting decisions. If bonus pools are fixed and promotion chances are limited, this could result in a heightened sense of unfair inequality and even induce lower effort in the first place. Furthermore, independent payoffs might result in higher motivation.

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Appendix

A World Values Survey

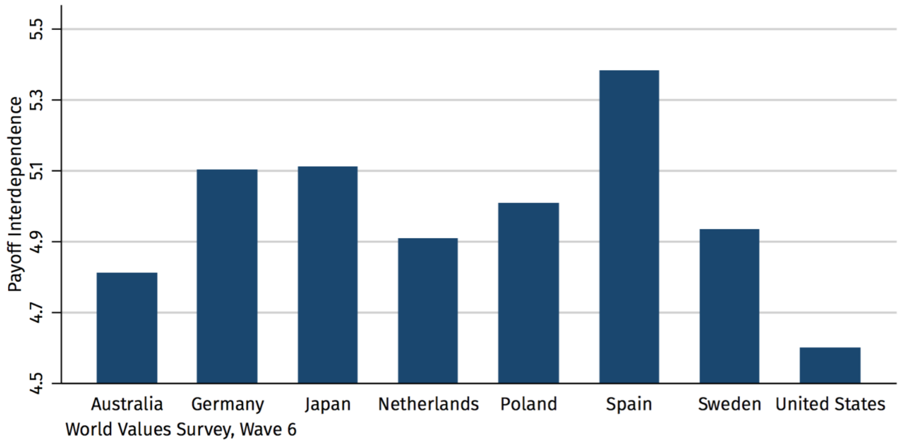


Figure A.1. Beliefs in the interdependence of payoffs of western countries

Notes: The figure presents the mean beliefs in the interdependence of payoffs in the western countries that are featured in wave 6 of the WVS (Inglehart et al., 2014).

B Worker behavior across treatments

The analysis of the redistribution decisions does not rely on the worker behavior elicited in the first stage of the experiment, but rather on the hypothetical pairs. Nonetheless, we can analyze the extent to which the different treatments induce variation in performance. Since the workers are not invited to the lab but rather take part via an online study, all of them have a true outside option and can spend their time freely. In addition, we elicit expectations for the average amount redistributed for each treatment.

Table B.1. Summary statistics for workers

	R-FC	R-CC	R-NC	D-FC	D-NC	Total
Performance	44.10	47.21	45.15	47.23	50.18	46.70
	(18.95)	(18.50)	(18.44)	(18.72)	(18.69)	(18.68)
Expected	2.837	2.551	2.581	2.207	2.311	2.500
Redistribution	(1.012)	(1.015)	(1.260)	(0.926)	(1.404)	(1.150)

Notes: This table reports the average number of tasks solved by treatments and average amount of redistribution workers expect to be redistributed in their treatment. Standard deviations are displayed in parentheses.

Table B.2. Worker behavior across treatments

	(1) Performance	(2) Expected Redistribution
R-CC	2.673	-0.269
	(2.879)	(0.180)
R-NC	1.825	-0.275
	(2.811)	(0.176)
D-FC	4.094	-0.654***
	(2.846)	(0.178)
D-NC	5.737**	-0.516***
	(2.916)	(0.182)
male	9.787***	-0.257**
	(1.846)	(0.115)
Age	-0.100	-0.007
	(0.178)	(0.011)
Constant	42.078***	3.117***
	(4.701)	(0.294)
N	400	400
R^2	.078	.051

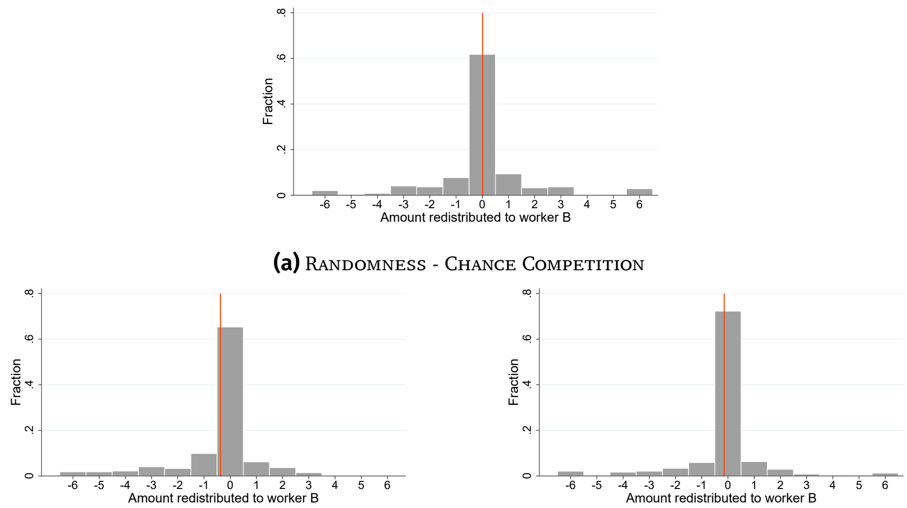
Notes: This table presents OLS regressions using the workers' performance (Column (1)) and the elicited expected redistribution (Column (2)) as outcomes. *, **, and *** denote significance at the 10, 5, and 1 percent level, respectively. Standard errors are displayed in parentheses and clustered at the participant level.

Looking at Table B.1, we find that the average performance slightly varies across treatments. Notably, we find that workers in treatments without any luck work more than in the other treatments. The regression in Table B.2 reveals that these differences are only statistically significant for the comparison of treatment *NR-NC* with *R-NC*, controlling for demographics of the subjects.

Similarly, workers expect levels of redistribution to be lower in the treatments without any randomness involved. Since we only elicit an average belief without mentioning specific performance levels, this clearly has mechanical reasons. Focusing on the beliefs for the treatment with luck, we find that workers expect a slightly, but not significantly, lower level of redistribution for the treatments without direct dependence in payoffs.

C Redistribution if both workers receive a prize

In the treatments without direct dependency of payoffs (*R-CC*, *R-NC*, and *NR-NC*), both workers can receive high earnings simultaneously. In order to identify the specific impact of this interdependence, in our main analysis of the paper we focus on those situations where only one player actually wins. As explained in Section 2, we



(a) Randomness - Chance Competition

(b) Randomness - No Competition

(c) Deterministic - No Competition

Figure C.2. Amount redistributed between workers when both win a prize

Notes: The figure presents the histogram of the money transferred to worker B when both workers receive a prize. The vertical red lines indicate the mean level of money transferred. Negative values imply that the spectator transfers money from worker B to worker A. The figures include only decisions for those situations that were featured in all three treatments.

also present the spectators with situations where two workers win. Naturally, the spectators might still want to redistribute earnings. However, here equality in payoffs is the default setting. If spectators care about (monetary) equality, they will not change the allocation in these situations. Hence, we do not expect any treatment differences.

The redistribution decisions for the three treatments with two potential prizes are displayed in Figure C.2. Here, the x-axis denotes the amount of money distributed to worker B. Accordingly, if spectators choose to redistribute nothing, worker B receives her prize of €6. In general, we find very little redistribution in these situations. In all treatments, spectators choose to not redistribute anything at all in more than 60% of the situations. Spectators deviate on average from the equal split by less than €1: they redistribute €0.91 in *R-CC*, €0.77 in *R-NC*, and €0.66 in *NR-NC* (either from worker A to worker B, or the other way around). In Table C.3, we present the results of a corresponding regression analysis. As redistribution is not one-directional (from worker A to B) but can go both ways, we use the deviation from the equal split as the dependent variable, such that we treat workers A and B symmetrically.We do not find any significant effect of the treatments, which implies that the treatments do not influence the redistribution decisions differentially. Column (3) additionally interacts the influence of performance differences with the treatment and does not reveal any significant effect either.

Table C.3. Impact of treatments on redistribution when both workers win a prize

	Deviation from Equal Split		
	(1)	(2)	(3)
No Competition	-0.202	-0.128	-0.153
	(0.240)	(0.187)	(0.217)
No Competition	-0.225	-0.225	-0.267
	(0.257)	(0.190)	(0.219)
Δ Performance		0.040***	0.038***
		(0.005)	(0.009)
No Competition × Δ Performance			0.002
			(0.011)
No Competition × Δ Performance			0.004
			(0.013)
Constant	1.333***	0.466***	0.488***
	(0.170)	(0.150)	(0.176)
N	357	758	758
R^2	.0038	.16	.16

Notes: This table presents OLS regressions using the absolute deviation from the equal split as the dependent variable. *, **, and *** denote significance at the 10, 5, and 1 percent level, respectively. Standard errors are displayed in parentheses and clustered at the participant level.

D Instructions of the Experiment

These are the instructions (translated from the German original) for the first stage (workers) and the second stage (spectators). We indicate differences between treatments within each screen.

D.1 Workers

Screen 1–Welcome. You are now participating in a study of the BonnEconLab.

Please read the following instructions attentively. In this study, you can earn money depending on your own choices and those made by other participants. It is therefore very important that you read the instructions carefully and understand them.

How much money you will receive at the end of this study depends on your own decisions and those made by other participants.

For this study, you will be put in a group of three participants. That is your group gets assigned another two participants.

On the next page, you will get to know your role in this group and your task.

Please click on “Next”.

Screen 2–Detailed information about the procedure of the study

In this study, you and a second participant from your group have the opportunity to work on tasks for up to twelve minutes.

Randomness:

For every completely solved task you will receive one lottery ticket. At the same time, the second participant receives one lottery ticket for every task he solved.

After the task-solving-phase, a lottery will determine your income.

In the following, you will get to know how this income is being determined:

Randomness-FC:

All lottery tickets, that is yours as well as the ones from the other participant, will be placed in one urn. Out of this urn one ticket is drawn at random. This means that for every task you solved you put one ticket in the urn. At the same time, for every task solved by the second participant he puts one ticket in the urn. Subsequently, one ticket is randomly drawn from the urn and the owner of this ticket receives a prize.

The owner of the drawn ticket receives a prize of 7 Euro and the other participant receives 1 Euro.

Example: Assume that you solved 30 tasks and the second participant solved 20 tasks. This means you are putting 30 tickets in the urn and the second participant puts 20 tickets in the urn. The possibility that one of your tickets is being drawn then amounts to $30/(30+20) = 30/50 = 60\%$.

Randomness-CC:

Each of you has his own urn. Inside your urn are your tickets as well as a number of blanks corresponding to the number of tickets in the other participant's urn.

This means that for every task you solved you put one ticket in your urn and one blank in the other participant's urn. At the same time, for every task solved by the second participant he puts one ticket in his urn and one blank in your urn.

Subsequently, one ticket is drawn from every urn; one from your urn and one from the other participant's urn. In the case that one of your tickets is being drawn from your urn you will receive a prize. In case a blank is drawn you will not receive a prize. For the other participant, a random draw is taken from his urn as well.

If one of your tickets is being drawn you receive a prize of 7 Euro. Otherwise, you receive 1 Euro. The same applies to the other participant. This means that it is possible for either both of you to receive a prize, as well as only one or even none of you.

Example: Assume that you solved 30 tasks and the second participant solved 20 tasks. This means you are putting 30 tickets in your urn and the second participant puts 20 blanks in your urn. The possibility that one of your tickets is being drawn then amounts to $30/(30+20) = 30/50 = 60\%$.

Randomness-NC:

Each of you has his own urn. Inside your urn are only your tickets and not those of the other participant.

This means that for every task you solved you put one ticket in your urn. In addition, both urns include as many blanks as another participant, who is not part of your group, solved tasks. This participant is not part of your group and his income is not dependent on yours. This participant and therefore the number of blanks inside your urn is chosen randomly.

Subsequently, one ticket is drawn from every urn; one from your urn and one from the other participant's urn. In the case that a ticket is being drawn from your urn you will receive an award. In case a blank is drawn you will not receive an award. For the other participant, a random draw is taken from his urn as well.

If one of your tickets is being drawn you receive a prize of 7 Euro. Otherwise, you receive 1 Euro. The same applies to the other participant. This means that it is possible for both of you to receive a prize, as well as only one or even none of you.

Example: Assume you solved 30 tasks and the randomly chosen participant solved 20. This means you are putting 30 tickets in your urn and the randomly chosen participant puts 20 blanks in your urn. The possibility that one of your tickets is being drawn then amounts to $30/(30+20) = 30/50 = 60\%$.

No Randomness:

After the task-solving-phase, the number of completed tasks will be compared and your incomes will be determined.

The number of completed tasks will be compared as follows:

No Randomness-FC:

The one of you who solved the most tasks will receive a prize.

If you solved more tasks than the other participant you receive 7 Euro. In case you solved less, you receive 1 Euro.

Example: Assume you solved 30 tasks and the second participant solved 20 tasks. As you solved more tasks than the second participant you receive a prize.

No Randomness-NC:

The number of tasks solved by you and the second participant will be compared to the number of tasks solved by another participant for both of you. This participant is not part of your group and his income does not depend on your solved tasks. This participant and therefore the amount of solved tasks is chosen randomly.

You receive a prize in the case that you solved more tasks than this randomly chosen participant. The same applies to the other participant from your group.

If you solved more tasks than the randomly chosen participant you receive 7 Euro. Otherwise, you receive 1 Euro. The same applies to the other participant. This means that it is possible for both of you to receive a prize, as well as only one or even none of you.

Example: Assume you solved 30 tasks and the randomly chosen participant solved 20 tasks. As you solved more tasks than the randomly chosen participant you receive a prize.

Decisions of the third participant

You will not be informed about your and the other participant's income directly after the study.

First, the third participant of your group, who does not participate in this part of the study, has the chance to reallocate your incomes. He knows the task that you had to solve but did not solve any tasks himself. However, this participant will be informed about the exact course of the study and the amount of tasks solved by you and the second participant. This means that he knows your income and that of the second participant as well as the number of tasks solved by each of you.

The third participant has the chance to reallocate the incomes. He can redistribute up to 6 Euro among you. Obviously, he can also choose to not change the incomes.

After the decision of the third participant and the completion of the study, your payout will be transferred to your bank account. Please note that this might take some time and you will receive the money in two weeks. We will inform you as soon as the transfer has been commissioned. At the same time, you will receive information about the choice of the third participant.

On the next screen the task will be explained. Please click on "Next".

Screen 3–Detailed information about the task

Your task is to change the position of sliders. For each task, five sliders will be presented to you on one screen. Each slider starts on the very left (position 0) and can be moved until the far right end of the scale (position 100). The current position of the slider is shown on the slider. The slider can be moved in three different ways: **by making use of the arrow keys, by moving the mouse or by clicking on the scale.**

Your task is to move the slider to the **middle position (position 50)**. The sliders can be worked on in any order. You can move a slider as many times as you want to and correct its position. Only after all five sliders have been moved to position 50, you will be able to reach the next task by clicking on the "Next"-button. In total, you will have 12 minutes of time to solve as many tasks as possible. After that, this part of the study ends. Please click "Next" to start with the solving of the task.

Screen 4–Slider task

No instructions.

Screen 5–Feedback

You solved X tasks.

Your payout is dependent on the result of the second participant as well as on the choice of the third participant in your group.

We kindly ask you to answer some further questions. After this, the study ends for you. We will inform you once your transfer has been commissioned.

D.2 Spectators

Screen 1–Welcome. You are now participating in a scientific study. You will receive at least 8 Euro for your participation. We ask you to carefully read the following instructions. If you have any question, please raise your hand and we will come to you.

In this study, you have the possibility to reallocate the income of two participants. For this, we will show you the income of several pairs of participants. These participants had the opportunity to solve tasks and gain a prize of 7 Euro. The participants who did not gain a prize received 1 Euro. Whether the participants received a prize or not, depended on the number of tasks solved by both participants. Participants had twelve minutes to solve the following tasks:

For each task, the participant faced a screen with five sliders. Each slider starts on the very left (position 0) and can be moved until the far right end of the scale (position 100). The task is to move the slider to the middle position (position 50) by making use of the arrow keys, moving the mouse or clicking on the scale.

Once all five sliders were in the correct position and the participant clicked "Next", the task was counted as solved.

In order to get a better understanding of the task, you will now be able to test the task for one minute.

Screen 2–Slider task

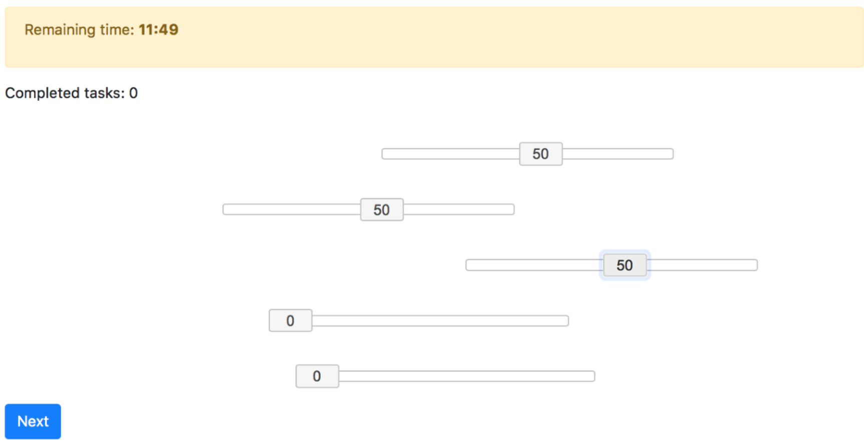


Figure D.4. Screenshot of the slider task in the experiment.

Screen 3–Your Result

You solved X tasks in one minute.

Screen 4–Determination of incomes

In the following we explain how incomes are determined.
Randomness
Receipt of tickets

Both participants (participant A and participant B) could gain tickets by solving the task which you tested. For each solved task they received one ticket. This means that the more tasks one participant solved the more tickets he received. The awarding of the prize was being determined by drawing tickets.
Randomness-FC
Awarding of the prize

For this, all tickets were placed in an urn. Out of this urn, one ticket was drawn. The owner of this ticket received a prize of 7 Euro, the other participant received 1 Euro. Therefore, always exactly one of the two participants received a prize.

Example: If participant A solved 25 tasks he received 25 tickets. Assume participant B solved 15 tasks, he received 15 tickets. Therefore, a total of 40 tickets were in play. The probability of receiving the prize amounted to 25/(25+15)=62.5% for participant A and 37.5% for participant B.
Randomness-CC

For this, the tickets were placed in two urns. The tickets from participant A were placed in an urn for participant A, the tickets from participant B in an urn for participant B. However, for every ticket that was placed into the urn of participant A, one blank was placed into the urn of participant B. The same procedure was applied to the tickets of participant B and the urn of participant A. This means that the urn of participant B included as many tickets as he solved tasks and as many blanks as participant A solved tasks.
Awarding of the prizes

One draw was conducted from each urn. If a ticket of participant A was drawn from participants A's urn, he received a prize of 7 Euro. If a blank was drawn he received 1 Euro. If a ticket was drawn from participant B's urn he as well received a prize of 7 Euro. If a blank was drawn he received 1 Euro. Therefore, both participants could receive a prize, as well as only one or even none of them.

Example: If participant A solved 25 tasks, 25 tickets were placed in his urn. Assume that participant B solved 15 tasks, 15 blanks were placed in the urn of participant A. Therefore, a total of 25 lots and 15 blanks were in the urn of participant A. With this the probability of receiving a prize amounted to 25/(25+15)=25/40=62.5% for participant A. At the same time, 15 lots and 25 blanks were in the urn of participant B. With this the probability of receiving a prize amounted to 15/(15+25)=15/40=37.5% for participant B.

Randomness-NC

For this, the tickets were placed in two urns. The tickets from participant A were placed in an urn for participant A, the tickets from participant B in an urn for participant B. In addition, a random number of blanks was placed in both urns. The number of blanks corresponded to the amount of tickets another, third participant gained by solving tasks. This randomly chosen participant did not have any other connection to participants A and B.

Awarding of the prizes

One draw was conducted from each urn. If a ticket of participant A was drawn from participants A's urn, he received a prize of 7 Euro. If a blank was drawn he received 1 Euro. If a ticket was drawn from participant B's urn he as well received a prize of 7 Euro. If a blank was drawn he received 1 Euro. Therefore, both participants could receive a prize, as well as only one or even none of them.

Example: If participant A solved 25 tasks, 25 tickets were placed in his urn. Assume that participant B solved 15 tasks, 15 tickets were placed in the urn of participant B. An additional 20 blanks were placed into each urn. Therefore, a total of 25 lots and 20 blanks were in the urn of participant A. With this the probability of receiving a prize amounted to 25/(25+20)=25/45=55.5% for participant A. A total of 15 tickets and 20 blanks were in the urn of participant B. With this the probability of receiving a prize amounted to 15/(15+20)=15/35=42.8% for participant B.

Randomness

To summarize: the more tasks a participant solved, the more tickets he received and the bigger were his chances of receiving a prize.

No Randomness-FC

For both participants (participant A and participant B) the number of solved tasks was counted. The participant with the higher number of solved tasks received a prize of 7 Euro. The other participant received 1 Euro. In the case that both participants had solved exactly the same number of tasks, the prize was allocated randomly. Therefore, always exactly one of the participants received a prize.

Example: Assume that participant A solved 25 tasks and participant B solved 15 tasks, then participant A received the prize.

No Randomness-NC

For both participants (participant A and participant B) the number of solved tasks was counted. At the same time, a number of tasks was chosen randomly. The number of tasks corresponded to the number of tasks another, third participant had solved. This random chosen participant did not have any other connection to participant A and B.

If participant A had solved more tasks than the randomly chosen number, he received a prize of 7 Euro. If he had solved fewer tasks, he received 1 Euro. The same was applied to participant B. Therefore, both participants could receive a prize, as well as only one or even none of them.

Example: Assume participant A had solved 25 tasks and participant B had solved 15 tasks. 20 tasks were chosen randomly. Consequently, participant A received a prize.
No Randomness

To summarize: the more tasks a participant solved, the bigger were his chances of receiving a prize.

Screen 5–Hypothetical pairs

We will present to you a total of X pairs of participants. For every pair, we will show you how many tasks participant A and participant B each solved, as well as the current income of both participants.

Out of all the pairs that we will present you, one pair is from the BonnEconLab. All the other pairs are fictional and do not represent real pairs. When you are making your decision you do not know which one of the pairs is not fictional. Please note that each of your decisions might become relevant for two participants of the BonnEconLab. You thus determine the payout for those two participants.

Both participants have not yet been informed about their current income and will only get to know their payout as determined by you.

If you have any questions please hold your hand out of the cabin.

Screen 6–Control questions

Before this study starts we ask you to answer some control questions:

1.) When does a task count as solved?

a. Once the time is over.

b. Once all sliders have been moved to position 50 and the “Next” button has been clicked.

c. Once at least one slider has been moved to position 50 and the “Next” button has been clicked.

2.) How many participants can win a prize at most?

a. None.

b. One participant.

c. Two participants.

No Randomness Assume that participant A solved 24 tasks and participant B solved 12 tasks. *No Randomness-NC* A random third participant with 6 solved tasks is chosen. *No Randomness*

3.) Which income does each of the participants receive?

Randomness Assume that participant A solved 24 tasks and participant B solved 12 tasks.

3.) How many tickets did each of the participants receive?

Randomness-NC By random choice it is determined that 6 blanks will be added to each urn. *Randomness*

4.) What is the probability to win for participant A?

Randomness-FC & CC

a. Number of tickets participant A / Number of tickets participant B.

b. Number of tickets participant B / (Number of tickets participant A + participant B).

c. Number of tickets participant A / 100.

d. Number of tickets participant A / (Number of tickets participant A + participant B).

Randomness-NC

a. Number of tickets participant A / Number of blanks.

b. Number of tickets participant B / (Number of tickets participant B + number of blanks).

c. Number of tickets participant A / (Number of tickets participant A + number of blanks).

d. Number of tickets participant A / (Number of tickets participant A + participant B).

Screen 8–Redistribution Decision

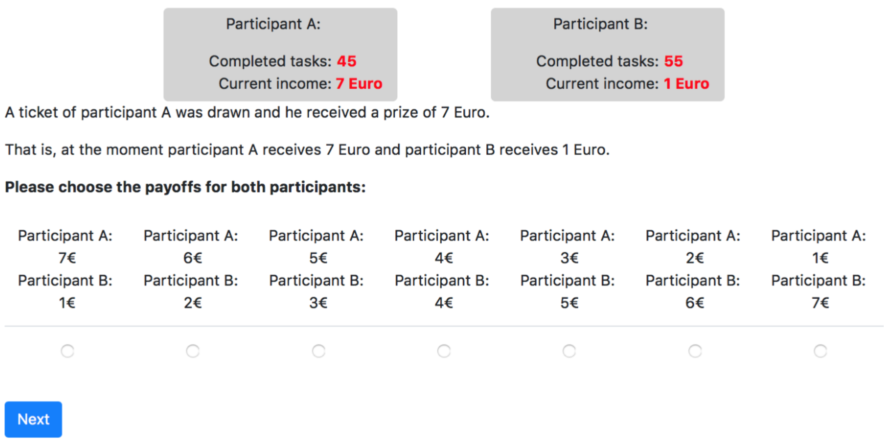


Figure D.5. Screenshot of the decision screen in the experiment.

Screen 9–Choice real pair

In the following, we once again show you all pairs for which you just determined the payout. As already explained, only one of those pairs is a non-fictional pair. Please indicate which of those pairs you consider to be the non-fictional one. If you choose the right pair, you will receive an additional payment of 1 Euro. If you do not choose the right pair you will not receive any additional payment.
[list of pairs]

Screen 10–Feedback real pair

You chose the right pair and will receive an additional payment of 1 Euro.
or

You did not choose the right pair.