Journal of Public Economics 243 (2025) 105320

Contents lists available at ScienceDirect

Journal of Public Economics

journal homepage: www.elsevier.com/locate/jpube

(Not) Everyone can be a winner — The role of payoff interdependence for redistribution[☆]

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ARTICLE INFO

JEL classification:
C91
D31
D63
H23

Keywords:
Redistribution
Fairness
Zero-sum
Social preferences
Lab experiment

ABSTRACT

Frequently, one person's success comes at the expense of others. We contrast such zero-sum environments in which individuals' payoffs are interdependent to those where payoffs are independent. In a laboratory experiment, we study whether the resulting inequality is perceived differently and how this affects redistribution. Across treatments, we compare a spectator's redistribution of two workers' earnings. If workers do not compete in a zero-sum setting, average redistribution decreases. In a representative survey, we replicate this finding and document that individuals who believe in a zero-sum world support higher levels of redistribution and are more likely to consider themselves a member of the Democratic party.

1. Introduction

Inequality has 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 et al., 2011; Keeley, 2015), political actors and institutions have to determine commonly accepted levels of redistribution. Implementing widely accepted policy measures requires a sound understanding of which allocations people perceive as fair. Therefore, identifying the underlying determinants of preferences for redistribution is crucial for designing effective institutions and mechanisms, and advancing our general knowledge of social preferences. In this paper, we propose payoff interdependence as a novel determinant and investigate its influence on fairness perceptions of inequality.

In a zero-sum environment, success always comes at the expense of others, meaning payoffs are negatively correlated and interdependent. As greater payoffs harm others, any inequality in such an environment may be seen as less acceptable. Conversely, if success is attainable for everyone simultaneously, unequal outcomes need not necessarily occur. As other (equal) outcomes are in principle possible, realized inequality may be more readily accepted.

Respondents in the World Values Survey (Inglehart et al., 2014) indeed seem to consider inequality less fair in zero-sum environments: Those who believe that wealth can only be accumulated at the costs of others are also more strongly in favor of a redistribution of incomes.[1] Notably, US respondents hold a significantly stronger belief in the independence of payoffs than those in all other developed countries.[2]

☆ We thank Arno Apffelstaedt, Gönül Doğan, Thomas Dohmen, Lorenz Goette, Sebastian Kube, Simone Quercia, Jonas Radbruch, Frederik Schwerter, Maj-Britt Sterba, and Matthias Wibral as well as audiences at Bonn, CRC TR 224 Workshop for Young Researchers in Mannheim, TIBER Symposium in Tilburg, Konstanz Conference on Decision Sciences, Nordic Conference on Behavioral and Experimental Economics in Odense, IMEBESS in Utrecht, M-BEES in Maastricht, and ESA World in Lyon for numerous helpful comments and feedback. We thank Felipe Azuero, Tanu Balooni, Charlotte Cordes, and Joaquin Felber in their assistance to conduct a pilot of the survey as part of their course work. Wave 2 of the experiment received ethical clearance from the Ethics Committee of the Faculty of Management, Economics and Social Sciences, University of Cologne, ERB 240040LS. This work was funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under Germany's Excellence Strategy – EXC 2126/1– 390838866. Funding by the Deutsche Forschungsgemeinschaft through CRC TR 224 (Project A01) is gratefully acknowledged. This paper should not be reported as representing the views of the Federal Ministry for Economic Affairs and Climate Action. The views expressed are those of the authors and do not necessarily reflect those of the Federal Ministry for Economic Affairs and Climate Action.

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[1] Both measures have a correlation of $\rho = 0.13$, $p < 0.0001$.

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

https://doi.org/10.1016/j.jpubeco.2025.105320
Received 15 March 2023; Received in revised form 31 January 2025; Accepted 1 February 2025
Available online 21 February 2025

This belief potentially translates to the welfare system: the social spendings in the US are among the lowest (Alesina and Angeletos, 2005; Schuknecht and Zemanek, 2021).

This paper investigates how payoff interdependence shapes the demand for redistribution in two ways: First, we conduct a laboratory experiment that isolates the causal effect of zero-sum environments on preferences for redistribution. In these environments, redistribution is larger than in non-zero-sum environments. Second, we underscore the robustness of our findings in the experiment by replicating this effect through a survey featuring a representative sample of US citizens. We furthermore show that the guaranteed inequality is the decisive aspect of zero-sum environments that leads to higher redistribution. Participants care about unrealized, counterfactual states in their assessment of inequalities. This aspect is missing in current models of social preferences that either only consider realized states ex post, or uncertain outcomes from an ex ante perspective (for an overview see Fehr and Charness, 2023).

In the laboratory experiment, pairs of workers work on a real-effort task and can win a prize. Afterwards, a spectator can redistribute the prize earnings between the two workers. We examine three different settings of prize-allocation procedures, where either effort, luck, or a combination of the two determines who receives a prize. In each setting, we vary the interdependence of the two workers' payoffs between treatments. Workers either face a zero-sum environment (treatments Zero-sum), where exactly one prize is allocated; or the reception of prizes is independent (treatments No Competition), and either no prize, one prize, or two prizes are awarded.

The first set of treatments features a merit-based, deterministic setting. In Deterministic – Zero-sum, the better-performing worker always wins the prize. In Deterministic – No Competition, workers do not compete against each other, but rather individually have to reach a randomly-drawn threshold, which is the same for both workers, to win a prize. In this treatment, the two of them can both win a prize at the same time, only one might win, or neither of them.

In the second set of treatments, allocation is based solely on luck. In Luck – Zero-sum, a coin toss determines the winner of the prize. In contrast, in Luck – No Competition, two independent coin tosses decide separately for each worker if they receive a prize.

The final set of treatments combines performance and luck. In Randomness – Zero-sum, workers compete for a single prize in a Tullock contest, with their relative performance determining their chances. In Randomness – No Competition, payoffs are independent: each worker still competes in a Tullock contest, but now individually against a randomly-drawn performance level, which is identical for both workers.

In all treatments, spectators are informed of the procedures generating the payoffs. After observing the outcome as well as the individual performances, they can redistribute payoffs between the two workers. 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 actual inequality, namely where only one worker receives a prize. This ensures that differences in redistribution decisions across treatments are not driven by varying levels of inequality.

We find that redistribution decisions are affected by a zero-sum environment whenever effort impacts prize allocation: The redistributed share is larger in Zero-sum than in No Competition. This effect is more pronounced in the setting involving Randomness than in the Deterministic setting. While we observe overall higher levels of redistribution in Randomness, the treatment reaction is also stronger. This is driven by the cases where the low-performing worker receives a prize in the Randomness setting (which is not possible in the Deterministic setting). Moreover, the nature of the environment also affects how spectators respond to performance differences. In general, spectators allocate a greater share to high-performing workers, with bigger differences resulting in even greater shares. However, in No Competition, differences matter less for redistribution decisions than in Zero-sum. In the former treatment, merit and deservingness are thus of less importance.

We further explore why zero-sum environments are perceived as more unfair in an additional mechanism treatment. Whenever effort influences prize allocation, a zero-sum environment entails two types of payoff interdependence. On the one hand, inequality is guaranteed such that one worker receiving a prize automatically implies that the other worker does not. On the other hand, higher effort increases the chances of one worker winning the prize, but also decreases the chances of the other worker. We disentangle these two factors with the treatment Randomness – Chance Competition. In this treatment, similar to Randomness – Zero-sum, both workers compete in a Tullock contest such that their share of total performance equals their chance of winning a prize. However, there is not a single random draw that allocates one prize. Instead, similar to Randomness – No Competition, there are two independent draws, one for each worker. With this procedure, workers still influence their chances of winning a prize, but one worker winning a prize no longer implies that the other does not. The zero-sum nature is removed. Participants redistribute significantly less in Randomness – Chance Competition than in Randomness – Zero-sum, and on a similar level as in Randomness – No Competition. The guaranteed inequality is what differentiates Randomness – Zero-sum from the other two treatments. The results thus suggest that the participants' aversion to zero-sum environments stems more from the guaranteed inequality than from the interdependence of chances.

Building on the results of the lab experiment, we examine the impact of zero-sum environments on redistributional preferences in a representative survey in the US. The first part of the survey investigates whether the main results translate to the general population. We present respondents with hypothetical scenarios that reflect either interdependence of payoffs of two employees in a zero-sum environment, or independent payoffs. We corroborate the results of the experiment and find more redistribution between the employees' payoffs in the zero-sum environment. Moreover, participants perceive zero-sum environments as less fair.

In the second part, we correlate respondents' beliefs in a zero-sum world with personal characteristics and attitudes. Consistent with previous findings, a stronger belief in a zero-sum world is related to a higher demand for redistribution, as well as the belief that success is due to luck. Furthermore, those who believe in a zero-sum world have a higher likelihood of considering themselves a member of the Democratic party.[3]

Our findings contribute to the literature on fairness and redistribution by being the first, to the best of our knowledge, to establish that inequality is tolerated more if it does not come at the expense of others. Our findings therefore highlight an important 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 et al., 2013), investment (Cappelen et al., 2007), and effort (e.g., Fischbacher et al., 2017; Sterba, 2022). Inequality is accepted when it originates from differences in performance and investment (e.g., Frohlich et al., 2004; Almås et al., 2020; Freyer and Günther, 2023; Andre, forthcoming), and equality is even seen as unfair (Abeler et al., 2010). Conversely, third parties tend to eliminate

[3] Considering oneself a member of the Democratic party is positively correlated with a belief that success is due to luck ($\rho = 0.13$, $p < 0.0001$), in accordance with the World Values Survey and previous literature, see, for instance, Gromet et al. (2015).

inequalities between others once luck is involved in the payoff mechanism (e.g., Mollerstrom et al., 2015; Breza et al., 2017; Gee et al., 2017; Rey-Biel et al., 2018).

We contribute to the literature in two key ways. First, we introduce and experimentally test a novel determinant of the demand for redistribution. We demonstrate that not only the source of inequality matters, but also features of the environment itself influence redistributional choices. Second, in the previous literature, zero-sum environments are predominantly used to test different sources of inequality. Our results indicate that performance differences are particularly important in zero-sum environments, suggesting that the stark contrasts observed between luck and merit may partially stem from the winner-takes-all environments employed in these experiments.

2. Design

In natural environments, the multitude of factors determining income and wealth as well as the lack of knowledge of the specific relationship between performance, luck, and outcomes make 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 zero-sum environments. To do so, we consider different settings with varying influence of luck and performance on outcomes.

Our design is based on a two-stage experiment, which features two types of participants: workers and spectators. In the first stage of the experiment, workers have the opportunity to win a prize. They are grouped in pairs and can work on a real-effort task. Subsequently, the winner(s) of the prize are determined. The payoff-generating mechanism is varied between treatments. In the second stage, each spectator observes performances and earning distributions of one pair and has the opportunity to redistribute earnings between the two workers. In some treatments, it is possible that both workers receive a prize.

We conducted two versions of the experiment (Wave 1 and Wave 2). Even though the core idea is identical in both waves, we highlight their differences in the description of the experiment as well as in Section 2.4.

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 win a prize of €6. They are also told that another participant — the spectator — can subsequently redistribute any earnings between the two workers. Workers then perform a real-effort task (repositioning sliders, based on Gill and Prowse, 2012). On every screen, participants have to adjust five sliders ranging from 0 to 100 to the mid-position (50) to complete the task. Each screen with five sliders counts as a single task. Workers may spend up to twelve minutes completing as many tasks as they like.

In settings where performance matters, the number of completed tasks is used to determine whether a worker is awarded a prize or not. In principle, a higher performance increases the likelihood of earning such a prize. Across treatments, we vary how earnings are realized. Workers are informed about the outcome-generating process; they know the number of potential prizes and how the allocation of prizes is determined, but are not informed of the actual outcome at this point. They are only informed that a third participant observes performances and earnings, and can redistribute any amount between the two workers. Workers receive information about their performances and final payoffs only after the spectators' decisions are implemented.

2.2. Spectators

In the second stage, a third participant—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. Whenever only one prize is allocated, we label worker A as the winner of that prize. 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, 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 participants with a series of combinations of performances and winners, and inform them that only one combination represents a real pair of participants, while the remaining pairs are hypothetical and predetermined by the experimenters. The order of the pairs is randomized between participants.[4] The number of prizes varies between treatments: In some treatments, it is possible for both or none of the workers to receive a prize, while in others this is not possible. The selected performances and the treatments in which they are used are displayed in Table 1. When making their decisions, participants do not know which pair is the real pair.[5] This method allows us to keep 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 their payoffs in most treatments. The mapping of performance to payoffs varies across treatments in two dimensions in a between-subjects design. The main variation involves the interdependence of payoffs. Moreover, we vary whether payoffs are determined by effort, luck, or a combination of the two. We provide an overview of all treatments in Table 2.

Deterministic The first set of treatments is under a Deterministic setting, where solely the performance of workers determines the allocation of the prize(s). In treatment Deterministic – Zero-sum, two workers compete for a single prize, which is allocated to the better-performing worker with certainty.[6] In this treatment, workers face a zero-sum environment. In the second treatment, Deterministic – No Competition, we remove the zero-sum environment. The performance of one worker no longer influences the other worker's payoff. Each worker receives a prize if she exceeds a randomly-drawn threshold. As a result, it is now possible for both workers to win a prize simultaneously, or for neither to win. The threshold corresponds to the performance of a randomly drawn third worker, who is otherwise uninvolved, and is identical for both workers.

Luck The second set of treatments, the Luck setting, also features a zero-sum and a non-zero-sum environment. Even though both workers still perform the real-effort task, their performance no longer influences the prize allocation; instead, luck determines the outcome. In Luck – Zero-sum, a coin flip determines which of the two workers receives a

[4] Participants see between 9 and 24 hypothetical pairs in Wave 1, and 5 hypothetical pairs in Wave 2. In Wave 1, the appearance of the real pair is randomized together with the hypothetical pairs. In Wave 2, the real pair always appears last.

[5] In Wave 1, participants learn the real pair after their decisions and almost all were unable to identify this pair. We ask them to guess the real pair in an incentivized ex-post question and only 12 out of 200 (6%) participants state a correct guess.

[6] If both workers have the same performance, the winner is randomly determined.

Table 1
Hypothetical pairs and their occurrence in treatments.

Situation	Winner	Perf. A	Perf. B	Random number	D-ZS	D-NC	L-ZS	L-NC	R-ZS	R-NC	R-CC
1	A	54	54	51	W1				W1	W1	W1
2	A	35	32	33	W1/W2	W1/W2	W2	W2	W1/W2	W1/W2	W1/W2
3	A	56	59	58			W2	W2	W1/W2	W1/W2	W1/W2
4	A	63	31	49	W1/W2	W1/W2	W2	W2	W1/W2	W1/W2	W1/W2
5	A	39	54	45			W2	W2	W1/W2	W1/W2	W1/W2
6	A	44	46	37					W1	W1	W1
7	A	45	55	26					W1	W1	W1
8	A	30	51	57			W2	W2	W1/W2	W1/W2	W1/W2
9	A	68	63	65	W1/W2	W1/W2			W1		W1
10	A	24	28	–					W1		W1
11	A	72	58	69	W1/W2	W1/W2			W1		W1
12	A	37	37	–	W1				W1		W1
13	A&B	61	61	63						W1	W1
14	A&B	38	35	28/36		W1				W1	W1
15	A&B	69	29	16/45		W1				W1	W1
16	A&B	47	64	27/51		W1				W1	W1
17	A&B	33	33	30		W1					W1
18	A&B	58	54	–							W1
19	A	67	67	45						W1	
20	A	66	73	55						W1	
21	A	42	37	50						W1	
22	A&B	49	49	32		W1				W1	
23	A&B	41	37	53						W1	
24	A	46	44	–	W1						
25	A	55	45	48	W1	W1					
26	A	51	30	34	W1/W2	W1/W2					
27	A&B	46	44	37		W1					
28	–	58	58	61		W1				W1	W1
29	–	41	36	45/38		W1				W1	W1
30	–	71	31	74/48		W1				W1	W1
31	–	43	62	67/52		W1				W1	W1
32	–	29	29	–							W1
33	–	64	64	–							W1
34	–	48	48	44						W1	
35	–	33	29	63						W1	

Notes: The table displays all hypothetical pairs presented to the spectators in the different treatments. Perf. A and Perf. B indicate the performance of worker A or worker B, respectively. D-ZS and D-NC are abbreviations for treatments Deterministic – Zero-sum and Deterministic – No Competition, L-ZS and L-NC are abbreviations for treatments Luck – Zero-sum and Luck – No Competition, and R-ZS, R-NC, R-CC for Randomness – Zero-sum, Randomness – No Competition, Randomness – Chance Competition, respectively. W1 and W2 denote that the situation is featured in the respective treatment in Wave 1 and Wave 2, respectively. Random number indicates the threshold for the No Competition treatments. For decisions 14 to 16 and 29 to 31, the first number corresponds to Deterministic – No Competition, and the second number to Randomness – No Competition. In addition to the hypothetical pairs, each spectator observes one individual real pair of workers of the first stage.

Table 2
Treatment overview.

Treatment	# Potential prizes	# Participants	
		Wave 1	Wave 2
Deterministic – Zero-sum	1	41	59
Deterministic – No Competition	2	37	61
Luck – Zero-sum	1	–	35
Luck – No Competition	2	–	45
Randomness – Zero-sum	1	40	60
Randomness – No Competition	2	43	60
Randomness – Chance Competition	2	39	60

Notes: This table presents a treatment overview. For each treatment, the maximum number of attainable prizes is presented, as well as the number of participants in the two waves of the experiment.

prize. Here, inequality is once again guaranteed. This is not the case in Luck – No Competition: two independent coin flips determine for each worker separately whether they receive a prize, such that two or zero winners are also possible.

Randomness After investigating the fairness perception of zero-sum environments for the extreme cases where only effort or luck determines the allocation of prizes, the final setting features a combination of the two. In the Randomness setting, having a higher performance than the opponent increases the chances of winning a prize, but does not guarantee it. The treatments in this setting are framed as a lottery. The completion of one task produces one lottery ticket, which is then thrown into an urn.

In Randomness – Zero-sum, 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, and one ticket is randomly drawn to determine the winner of the contest.

In Randomness – No Competition, in contrast, each worker has her own urn, containing only her own earned tickets. Moreover, a number of blanks is added to each urn. The number of blanks, once again, corresponds to the performance of a third uninvolved worker and is identical for both workers. Subsequently, an independent draw is executed for each worker. This, once again, allows for both or none of them winning a prize at the same time.

Our analysis exclusively focuses on one-winner outcomes. Spectators of Wave 1 still also face hypothetical worker pairs where both or none of the workers win a prize in treatments Deterministic – No Competition, Luck – No Competition and Randomness – No Competition. This is necessary as spectators make enough decisions to expect all three cases to happen. Further, since such an outcome is possible for the real worker pairs, the real pair would otherwise stand out if this pair were the only one with no or two winners. In Wave 2, we reduced the number of hypothetical pairs to five, presented the real pair last, and abstained from including hypothetical pairs with two or no winners. We report in Table 1 all hypothetical pairs used.

2.4. Procedures

Wave 1 was conducted with the participant pool of the BonnEconLab between April and June 2018, and hroot (Bock et al., 2014) was used for recruitment. Wave 2 was conducted with the participant pool of the Cologne Laboratory for Economic Research in August 2024, where participants were recruited via ORSEE (Greiner, 2015). The experiment was computerized via oTree (Chen et al., 2016). We provide instructions for the experiments in Appendix D and Appendix E. The first stage of the experiment was conducted online in both waves. In addition, the participants completed a short questionnaire. This part of the study lasted about 20 minutes and participants earned on average €4.49. In Wave 1, spectators were invited to the BonnEconLab to make their redistribution decisions. In Wave 2, spectators made their decisions online. Spectators received a flat fee of €8 for their participation. In Wave 1, they could earn an extra €1 by correctly guessing the non-hypothetical pair of workers after they had made all redistribution decisions. After finishing the redistribution decisions, participants answered a questionnaire. In Wave 1, this included questions on locus of control (Rotter, 1966) and social inequality (Scholz et al., 2011). In Wave 2, the questionnaire included items from the World Values Survey (Inglehart et al., 2014) on preferences for equality, competitiveness, beliefs about whether success is due to luck or effort, and whether the world is zero-sum. Both waves ended with a sociodemographic questionnaire. The second stage took about 40 min.

Participants were assigned within-session to treatments at random. In Wave 1, we conducted the treatments in the Deterministic and Randomness setting. Wave 2 additionally included the treatments in the Luck setting. In Wave 1, for each spectator making a decision, one pair of workers was recruited to generate the underlying performance and earning distribution. In Wave 2, each worker pair was used for four spectators, and this was known to all participants. Overall, in Wave 1, 200 spectators and 400 workers participated. In Wave 2, there were 380 spectators and 190 workers.

3. Results

Our experimental design allows us to study the causal effect of a zero-sum environment on preferences for redistribution. In total, we analyze three sets of treatments that either constitute a zero-sum game between two workers, or feature no interdependence between these two workers. We first consider a deterministic setting in Section 3.1, where prize allocation is based on worker performances. In Deterministic – Zero-sum, workers compete in a winner-take-all contest where the higher-performing worker receives a prize. In contrast, in Deterministic – No Competition, any worker whose performance exceeds a randomly drawn threshold receives a prize. Next, we examine the treatments with pure luck in Section 3.2. In these treatments, prize allocation is independent of performance and is instead determined by a coin toss. In Luck – Zero-sum, the winner of a single coin toss receives a prize, whereas in Luck – No Competition, two independent coin tosses determine each worker's outcome. Finally, in Section 3.3, we present results of treatments where both merit and luck influence outcomes. In Randomness – Zero-sum, the two workers compete in one Tullock contest, whereas, in Randomness – No Competition, each worker competes in a separate Tullock contest against a randomly drawn performance level.

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.[7] As a consequence, differences between treatments cannot be explained by differing numbers of actual winners. Throughout this section, we examine how much of the €6 prize the spectators choose to redistribute to the losing worker.

[7] Equal earnings cannot arise in Zero-sum. Naturally, other tournament outcomes are possible in No Competition. Corresponding situations are shown to the spectators, see Table 1 for the situations with two and zero winners in Wave 1. 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 B.4. We do not observe many decisions to redistribute, and we observe no treatment differences. If no worker receives a prize, redistributing the prize money is impossible.

In this section, we present results for both waves combined (Luck treatments were only part of Wave 2). The corresponding separate results are reported in Appendix B. In each subsection, we first focus on the redistribution behavior in those situations that are featured in all analyzed treatments (see Table 1). Participants thus observe 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.

3.1. *The effect of zero-sum environments on redistribution in a deterministic setting*

We begin by examining the treatments Deterministic – Zero-sum and Deterministic – No Competition, where performance determines the allocation of prizes. Figure B.2 in the Appendix displays the distributions of redistribution decisions featured in both treatments.[8] When the two workers face a zero-sum environment, the spectators transfer, on average, €1.36 to the loser. Almost no spectators transfer more than half of the prize to the loser; instead, in 35% of decisions, no redistribution occurs, while equal earnings are chosen in 18% of cases. In Deterministic – No Competition, the average transfer is slightly reduced to €1.3.

We present the estimates from the corresponding regression analyses in Table 3. Column (1) includes only situations that are featured in both treatments and waves. In Deterministic – No Competition, redistribution decreases by €0.06, a change that is not statistically significant. Next, we include all decisions where only one worker receives a prize and control for both the winner's performance and the performance difference between the winner and loser (Column (2)).[9] The treatment effect slightly increases, but remains non-significant ($p = 0.35$). At the same time, we observe that spectators strongly condition their redistribution decision on the performance difference between the two workers. In contrast, the effect of the absolute performance level of the winner, albeit significant, is very small in size. Finally, we consider the interaction of treatment and performance difference in Column (3). In Deterministic – No Competition, redistribution is now weakly significantly reduced by €0.28, approximately a 13% decrease. This increase in the effect size can be attributed to worker pairs who have small performance differences. Redistribution decisions for these pairs exhibit the largest difference between treatments. For larger performance differences, spectators redistribute less to the loser but more similar across treatments. As a consequence, the impact of performance differences changes across treatments. When the zero-sum nature is removed, the effect of performance differences is significantly muted; the spectators' reaction to a ten-task change in the performance difference decreases from €0.46 in Deterministic – Zero-sum to €0.35 in Deterministic – No Competition.

3.2. *The effect of zero-sum environments on redistribution under luck*

Next, we examine the setting where payoffs are independent from effort and determined solely by luck. Figure B.3 in the Appendix depicts the distributions of redistribution decisions for Luck – Zero-sum and Luck – No Competition, looking at situations that are featured in both treatments.[10] In the zero-sum environment, spectators redistribute, on

[8] These are situations 2, 4, 9, 11, and 25 of Table 1.

[9] The performance of the winner is centered around the mean performance in situations 2, 4, 9, 11, and 26. This means that the constant represents the amount redistributed in Deterministic – Zero-sum if both workers have an average performance and the effect of Column (1) is also evaluated at this mean.

[10] These are situations 2, 3, 4, 5, and 8 of Table 1.

Table 3
Impact of a zero-sum environment on redistribution for Deterministic treatments.

	Amount redistributed to loser		
	(1)	(2)	(3)
No Competition	−0.062	−0.117	−0.280*
	(0.131)	(0.124)	(0.155)
Performance winner (cent.)		−0.003**	−0.003**
		(0.001)	(0.001)
Δ Performance		−0.042***	−0.046***
		(0.003)	(0.004)
No Competition × Δ Performance			0.011**
			(0.005)
Wave 2	0.012	−0.072	−0.059
	(0.137)	(0.130)	(0.131)
Constant	1.353***	2.128***	2.184***
	(0.140)	(0.130)	(0.135)
N	990	1343	1343
Participants	198	198	198
R^2	.00	.19	.20
Avg. redistribution	1.3	1.4	1.4

Notes: This table presents OLS regressions for treatments Deterministic – Zero-sum and Deterministic – No Competition of both waves combined, using the money redistributed to the loser as the dependent variable. *, **, and *** denote significance at the 10, 5, and 1% level, respectively. Standard errors are displayed in parentheses and clustered at the participant level. Performance Winner is the performance of the winner of the prize and is centered on the average performance of those situations that are featured in both treatments and waves, see Table 1. Δ Performance is the difference between the performances of the winner and the loser. Wave 2 indicates a wave fixed effect. Average redistribution indicates redistribution to the loser across both treatments. Column (1) only includes decisions of situations featured in both treatments and waves. Column (2) features all decisions. Column (3) shows a joint test of the treatment effect and the interaction effect with the performance difference.

average, €2.63 to the unfortunate worker. When the two workers face independent coin flips, the average redistribution is slightly lower at €2.58. In contrast to the deterministic setting, redistributions greater than €3 occur in about a third of the decisions in both treatments. In these decisions, the lower-performing worker received the prize. This suggests that spectators take performances into account, even though they are irrelevant to prize allocation. This is corroborated in the corresponding regression analyses reported in Table 4. Similar to the analyses in the previous subsection, we consider three different regressions. First, in Column (1), we include all decisions of scenarios common to both treatments. We then also use real pairs, controlling for performance levels and differences. Finally, in Column (3), we additionally interact performance difference and treatment. In contrast to the deterministic setting, there is no treatment effect in any of the regressions. However, spectators still consider workers' performances, reducing their transfers by €0.40 for every 10-task increase in the performance difference.

3.3. The effect of zero-sum environments on redistribution in a setting featuring randomness

Until now, we have considered situations where either effort or luck determined the allocation of prizes. We now turn to a setting where both components play a role. In Randomness – Zero-sum and Randomness – No Competition, higher performance increases the likelihood of winning a prize, but does not guarantee it. Luck can lead to the lower performer receiving a prize. Panels (a) and (b) of Figure B.4 in the Appendix display histograms of redistribution decisions for those situations featured in both treatments.[11] In the zero-sum environment, spectators redistribute, on average, €2.82 to the loser. Spectators choose to equalize earnings between the two workers in about a third of the situations (32.4%). Once the zero-sum nature is

[11] These are situations 2, 3, 4, 5, and 8 of Table 1.

Table 4
Impact of a zero-sum environment on redistribution for Luck treatments.

	Amount redistributed to loser		
	(1)	(2)	(3)
No Competition	−0.052	−0.036	−0.037
	(0.254)	(0.258)	(0.257)
Performance winner (cent.)		−0.001	−0.001
		(0.006)	(0.006)
Δ Performance		−0.046***	−0.040***
		(0.006)	(0.009)
No Competition × Δ Performance			−0.010
			(0.008)
Constant	2.634***	2.620***	2.621***
	(0.189)	(0.188)	(0.187)
N	400	458	458
Participants	80	80	80
R^2	.00	.27	.27
Avg. redistribution	2.6	2.6	2.6

Notes: This table presents OLS regressions for treatments Luck – Zero-sum and Luck – No Competition, using the money redistributed to the loser as the dependent variable. *, **, and *** denote significance at the 10, 5, and 1% level, respectively. Standard errors are displayed in parentheses and clustered at the participant level. Performance Winner is the performance of the winner of the prize and is centered on the average performance of those situations that are featured in both treatments, see Table 1. Δ Performance is the difference between the performances of the winner and the loser. Average redistribution indicates redistribution to the loser across both treatments. Column (1) only includes decisions of situations featured in both treatments. Column (2) features all decisions. Column (3) shows a joint test of the treatment effect and the interaction effect with the performance difference.

Table 5
Impact of a zero-sum environment on redistribution for treatments with Randomness.

	Amount redistributed to loser		
	(1)	(2)	(3)
No Competition	−0.422***	−0.342***	−0.364***
	(0.156)	(0.130)	(0.133)
Performance winner (cent.)		−0.001	0.000
		(0.002)	(0.002)
Δ Performance		−0.046***	−0.055***
		(0.003)	(0.003)
No Competition × Δ Performance			0.017***
			(0.005)
Wave 2	−0.225	−0.318**	−0.322**
	(0.148)	(0.135)	(0.134)
Constant	2.960***	2.981***	2.997***
	(0.126)	(0.109)	(0.110)
N	977	1601	1601
Participants	203	203	203
R^2	.02	.27	.28
Avg. redistribution	2.6	2.6	2.6

Notes: This table presents OLS regressions for treatments Randomness – Zero-sum and Randomness – No Competition of both waves combined, using the money redistributed to the loser as the dependent variable. *, **, and *** denote significance at the 10, 5, and 1% level, respectively. Standard errors are displayed in parentheses and clustered at the participant level. Performance Winner is the performance of the winner of the prize and is centered on the average performance of those situations that are featured in both treatments and waves, see Table 1. Δ Performance is the difference between the performances of the winner and the loser. Wave 2 indicates a wave fixed effect. Average redistribution indicates redistribution to the loser across both treatments. Column (1) only includes decisions of situations featured in both treatments and waves. Column (2) features all decisions. Column (3) shows a joint test of the treatment effect and the interaction effect with the performance difference.

removed in Randomness – No Competition, spectators redistribute less. The average amount redistributed to the loser drops to €2.40. Although a similar proportion redistributes €3 to the loser, the share of those who do not redistribute rises from 16% to 23%. The two distributions are significantly different using a Kolmogorov–Smirnov test ($p < 0.05$).

We present the estimates from the corresponding regression analyses in Table 5. Column (1) includes only situations that are featured in both treatments and waves. Removing the zero-sum nature significantly lowers the transfer to the loser by €0.42, a decrease by 14%.

This treatment effect is robust once we include all decisions in which only one worker receives a prize, and control for the winning performance as well as the performance difference between winner and loser (Column (2)). As in the Deterministic setting, spectators do not base redistribution on absolute performance levels, but respond strongly to performance differences between the two workers.

As observed in the Deterministic setting, the impact of performance differences varies across treatments (Column (3)). In Randomness – No Competition, the effect of performance differences is significantly muted; the spectators' response to a ten-task change in performance difference drops from €0.55 in a zero-sum environment to €0.38 in a non-zero-sum environment.

In summary, we investigate the effect of zero-sum environments in three different settings that differ in the source of inequality with either luck or effort, or a combination of the two. We find that the number of potential prizes matters for settings that feature (some degree of) merit. More precisely, the absence of a zero-sum environment affects redistribution behavior in two separate ways. First, if high earnings for one person prohibit high earnings for another, inequality is less accepted compared to a situation in which both can win simultaneously. Average redistribution is higher in Zero-sum treatments than in No Competition treatments. This effect is more pronounced in Randomness than in Deterministic. Second, without this interdependence, redistribution decisions react less to individuals' performance differences and inequality is more frequently accepted, irrespectively of performances. Spectators condition their redistribution less on performance differences in No Competition than in Zero-sum.

Low vs. high performer wins. In the Randomness setting, it is possible that the low performer receives a prize while the high performer does not. We can thus examine outcomes separately, depending on whether the low or high performer receives a prize. Fig. 1 displays the corresponding distributions of the redistribution decisions that are featured in both treatments. When the high performer wins, redistribution decisions are similar across treatments, with almost no spectator transferring more than €3 to the loser. In contrast, when the low performer wins, most transfers exceed €3. This is more pronounced in Randomness – Zero-sum than in Randomness – No Competition[12] and the average amount redistributed drops from €3.59 to €2.87. Regressions in Table 6 indicate that the treatment effect observed in Table 5 is primarily driven by situations where the low performer wins, even when controlling for performance differences. Although still sizable, the interaction between performance difference and Randomness – No Competition is no longer significant ($p = 0.35$). One interpretation of this pattern is that when payoffs are independent and each worker has an individual chance of winning, this offsets to some extent the perceived unfairness of the low performer receiving the prize.

The stark difference between scenarios where either the high or low performer wins may explain why the treatment effect is stronger in Randomness than in Deterministic, as the latter does not allow for the low performer to win alone. Nonetheless, the similar directional effects observed in the Deterministic setting suggest that inequalities in non-zero-sum contexts are more readily accepted, also in a setting that precludes inequalities in favor of lower-performing workers. We next investigate potential mechanisms.

Heterogeneity. The post-experimental questionnaire collects, in addition to demographics, data on locus of control and the need for a strong state (Wave 1), and beliefs and political preferences (Wave 2). We divide the sample into above- and below-median subgroups for each variable. Figure B.9 in the Appendix shows average redistribution for Randomness – Zero-sum and Randomness – No Competition for each subcategory, again focusing on situations featured in both treatments (and waves, where applicable). The first observation is that redistribution is higher in Randomness – Zero-sum than in Randomness – No Competition among all variables and subgroups. Second, the effect sizes are generally consistent across subgroups. However, gender is an exception. While males show only a marginal decrease in redistribution in Randomness – No Competition, females exhibit a significant reduction of 23% ($p < 0.01$). Accordingly, the treatment effect is weakly significantly larger for females than for males ($p < 0.1$). However, if we control for multiple hypothesis testing, this effect is no longer significant.

Table 6
Impact of a zero-sum environment on redistribution for treatments with Randomness by winner type.

	Amount redistributed to loser			
	High performer wins		Low performer wins	
	(1)	(2)	(3)	(4)
No Competition	−0.018	−0.065	−0.713***	−0.538**
	(0.151)	(0.182)	(0.205)	(0.213)
Performance winner (cent.)		0.000		−0.007
		(0.004)		(0.005)
Δ Performance		−0.037***		−0.039***
		(0.004)		(0.007)
No Competition × Δ Performance		0.005		0.012
		(0.005)		(0.013)
Wave 2	−0.345**	−0.265*	−0.244	−0.392**
	(0.152)	(0.147)	(0.198)	(0.185)
Constant	1.937***	2.486***	3.751***	3.369***
	(0.148)	(0.137)	(0.181)	(0.172)
N	406	640	571	794
Participants	203	203	203	203
R^2	.01	.18	.05	.09
Avg. redistribution	1.7	1.7	3.2	3.3

Notes: This table presents OLS regressions for treatments Randomness – Zero-sum and Randomness – No Competition of both waves combined, separately for the high or low performer winning a prize, using the money redistributed to the loser as the dependent variable. *, **, and *** denote significance at the 10, 5, and 1% level, respectively. Standard errors are displayed in parentheses and clustered at the participant level. Performance Winner is the performance of the winner of the prize and is centered on the average performance of those situations that are featured in both treatments and waves, see Table 1. Δ Performance is the performance of the winner of the prize and is the difference between the performances of the winner and the loser. Wave 2 indicates a wave fixed effect. Average redistribution indicates redistribution to the loser across both treatments. Columns (1) and (2) feature situations where the high performer wins a prize. Columns (3) and (4) feature situations where the low performer wins a prize. Column (1) and (3) only include decisions of situations featured in both treatments and waves. Column (2) and (4) feature all decisions and show a joint test of the treatment effect and the interaction effect with the performance difference.

Mechanism. In the two settings where effort influences outcomes, a zero-sum environment involves two types of interdependence. First, if one worker receives a prize, the other cannot: inequality is guaranteed. Second, workers influence their *chances* of winning by exerting effort: In Deterministic – Zero-sum, one worker must outperform the other, meaning higher performance increases the likelihood of winning. Similarly, in Randomness – Zero-sum, a worker's chance of winning is proportional to their share of total performance, so higher performance increases their likelihood of winning while decreasing the opponent's chance. Therefore, the decrease in transfers from Zero-sum to No Competition could be driven by the guaranteed inequality (i.e., there is always exactly one winner and one loser), the mutual influence on winning chances, or both.

We investigate this with the additional treatment Randomness – Chance Competition. In this treatment, each worker's chance of receiving a prize is still the same as in Randomness – Zero-sum, with both workers producing tickets that are placed into an urn. However, instead of one draw determining both workers' earnings simultaneously, the urn

[12] The two distributions are significantly different using a Kolmogorov–Smirnov test ($p < 0.001$).

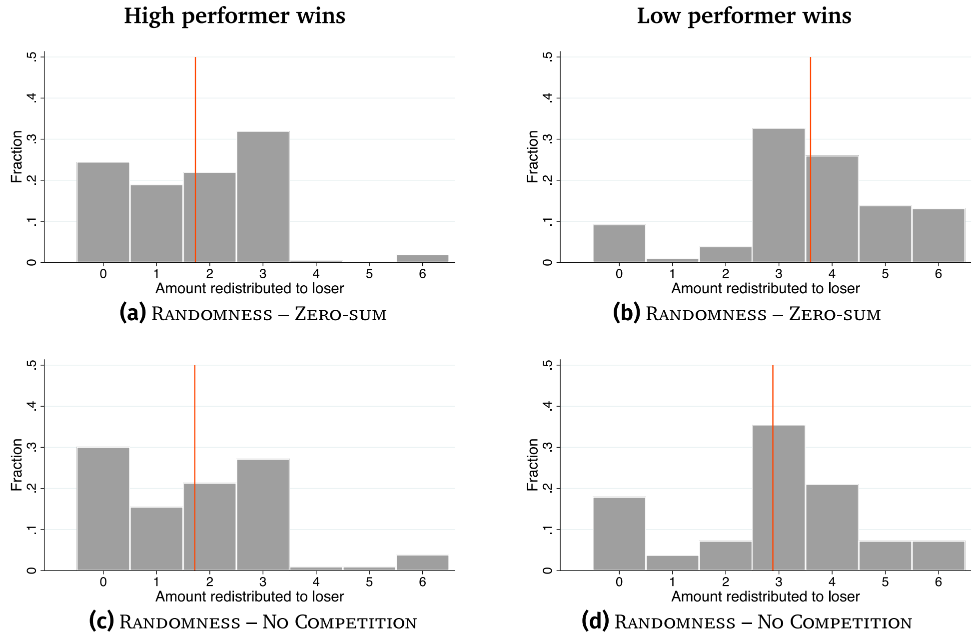

Fig. 1. Amount redistributed to the loser in Randomness treatments for separate winner types.
Notes: The figure presents the histograms of the money transferred to the loser in the two Randomness treatments separately for situations where the high-performing or the low-performing worker receives a prize. The vertical red lines indicate the mean level of money transferred. The figures include only transfers for those situations that were featured in both treatments.

is duplicated, and each worker has an independent draw, similar to Randomness – No Competition. With this procedure, we keep the interdependence in chances of winning a prize while removing the zero-sum nature at the same time.

Panel (c) of Figure B.4 in the Appendix shows the distribution of the redistribution decisions for Randomness – Chance Competition. In this treatment, 24.4% of spectators do not redistribute any money, and the average redistribution is €2.33. These figures are similar to Randomness – No Competition, with no significant difference between the distributions ($p > 0.9$). The distributions of Randomness – Zero-sum and Randomness – Chance Competition, on the other hand, are significantly different ($p < 0.01$). Regression results reported in Table B.5 in the Appendix confirm this: Redistribution in Randomness – Chance Competition is significantly lower than in Randomness – Zero-sum, but not significantly different from Randomness – Chance Competition ($p > 0.2$), although the coefficient is moderately sized in the full model. The significant difference between Randomness – Zero-sum and Randomness – Chance Competition indicates that the zero-sum nature itself with its guaranteed inequality is most important for redistributional choices. Further, the similar redistribution decisions in Randomness – Chance Competition and Randomness – No Competition show that the interdependence in the chances of winning a prize are of less importance.

4. Survey

In Section 3, using a lab experiment, we have presented causal evidence for the impact of a zero-sum environment on redistribution. To provide further evidence, we conducted a representative survey in the US. The survey is divided into two parts. In the first part, we present participants with vignettes describing different bonus schemes and let them make decisions that mirror the treatments in the experiment. In many real-life situations, people may have only a limited idea whether the environment is zero-sum or not. Nonetheless, they might hold beliefs about the nature of the environment that correlate with their preferences for redistribution. In the second part, we therefore measure the belief in a zero-sum world and other beliefs about the world and political attitudes of our participants.

We conducted the survey through *Dynata* (formerly known as *Research Now*) in September 2020 with a total of 601 participants.[13] The recruited sample is representative of the US population regarding age (from 18 to 65), gender, and geographical location. See Table C.10 in the Appendix for a comparison with the Current Population Survey.[14] The average participant is 41 years old and 51% are female.

4.1. Hypothetical scenarios

In the first part of the survey, participants are shown vignettes describing hypothetical scenarios where two co-workers have the chance to receive a bonus. As in our experiment, only one ultimately receives the bonus. Participants then assess the fairness of the inequality and decide how to redistribute the bonus between the two workers. Similar to the main experiment, we vary whether only one worker can receive a bonus (zero-sum scenario), or both workers can obtain a bonus simultaneously (no-competition scenario). In these scenarios, the number of attainable bonuses is clearly stated. Additionally, there is a scenario where the number of bonuses available is not specified (ambiguous scenario). Here, participants have to form a belief about how many bonuses are paid out by the employer. The idea is to match participants' decisions in the ambiguous scenario to the other two scenarios to identify individuals who, in an ambiguous situation, have a zero-sum-world or non-zero-sum-world mindset. If a participant's redistribution in the ambiguous scenario resembles their decision in the zero-sum scenario, they are classified as having a zero-sum mindset. Equivalently, redistributing more closely to the no-competition scenario would be classified as having a non-zero-sum mindset. For this purpose, the ambiguous situation is either presented first or last, while the other two scenarios are presented in a random order. We thus employ a within-subject design and every participant observes all three types of scenarios. Each vignette seen by the participants has a slightly different setup, where occupation, the amount of the bonus, and the timespan

[13] We excluded participants who failed at least two of three attention checks.
[14] The sample is also balanced across our variation (the order of the vignettes), see Table C.11 in the Appendix.

differ.[15] The mapping of the setup to the scenario is randomized on the individual level such that some participants see, for instance, a zero-sum scenario with high bonuses, whereas others see a zero-sum scenario with low bonuses. The vignettes are reported in Appendix C.1.

4.2. Results

The bonus size varies across settings ($20, $50, and $2000), making direct comparisons of absolute values across scenarios difficult. Therefore, in the first part of the survey, we standardize the amount redistributed to the worker who did not receive the bonus. We standardize our measure of perceived fairness as well. The first observation is that participants judge inequality as fairer in the no-competition scenario than in the zero-sum scenario (the latter is perceived to be 0.2 of a standard deviation less fair, $p < 0.001$) and accordingly redistribute 0.14 of a standard deviation more in the zero-sum scenario ($p < 0.001$). Equivalent to the experiment, we further execute median splits for the measures elicited in the second part of the survey.[16] We plot the histograms of the share redistributed and perceived fairness for these subgroups in Figure C.13 and Figure C.14, respectively, in the Appendix. Redistribution is higher in the zero-sum scenario compared to the no-competition scenario across all subgroups. Analogous, the no-competition scenario is always perceived as fairer. Effect sizes are similar for both subgroups for most categories. Unlike the experiment, there is no difference either between women and men. However, stronger treatment effects for redistribution and fairness are observed among participants considering themselves a member of the Democratic party compared to those considering themselves a member of the Republican party. This difference is weakly significant for the perceived fairness of the scenarios ($p < 0.1$). Taken together, these findings corroborate our experimental results, where zero-sum environments also led to increased redistribution.

The third, ambiguous, scenario is perceived as less fair than both other scenarios and redistribution is significantly higher as well, see Table 7.[17] One potential reason for increased redistribution in the ambiguous setting is the participants' uncertainty about the allocation process. They may believe that the workers themselves are also unclear about the process, leading them to perceive this environment as less fair. Another reason could be that the zero-sum and no-competition scenarios are framed similarly to the Deterministic setting of the experiment. In contrast, the ambiguous scenario lacks a clear notion of merit, allowing for the possibility that luck is also of importance. Since we observe higher levels of redistribution in the non-deterministic settings of the experiment, this could also be the case here.

This section provides additional evidence that zero-sum environments affect fairness perceptions and redistributional preferences. In Appendix C.2, we investigate whether people differ in their beliefs in a zero-sum world, and how such a belief is related to other important beliefs about the world as well as political orientation. In summary, we find, among others, significant positive correlations of a belief in a zero-sum world with demand for redistribution and the belief that luck matters for success. Further, in line with the above findings, participants considering themselves a member of the Democratic party have a stronger belief in a zero-sum world, as illustrated in Fig. 2.

Table 7
Survey: impact of payoff interdependence on redistribution and fairness.

	Redistribution		Perceived fairness	
	(1)	(2)	(3)	(4)
Zero-sum	0.139***	0.141***	−0.203***	−0.200***
	(0.046)	(0.046)	(0.038)	(0.039)
Ambiguous	0.256***	0.225***	−0.350***	−0.347***
	(0.047)	(0.054)	(0.044)	(0.043)
Constant	−0.132***	−0.004	0.184***	0.152**
	(0.044)	(0.077)	(0.038)	(0.069)
Controls	No	Yes	No	Yes
N	1803	1803	1803	1803
Individuals	601	601	601	601
R^2	.01	.03	.02	.03
p-value: ZS vs. amb.	.0079	.092	.0003	.0003

Notes: This table presents OLS regressions using the money redistributed to the loser as the dependent variable in Columns (1) and (2), and perceived fairness of the initial allocation in Columns (3) and (4). ZS indicates the zero-sum scenario. All dependent variables are standardized. Controls indicate the inclusion of fixed effects for setting, presentation order of scenarios, and decision number. *, **, and *** denote significance at the 10, 5, and 1% level, respectively. Standard errors are displayed in parentheses and clustered at the participant level.

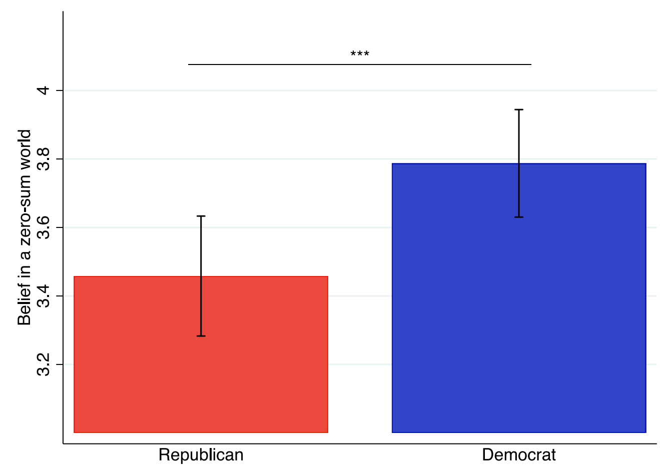

Fig. 2. Survey: belief in a zero-sum world by political party.
Notes: The figure presents the histogram of the belief in a zero-sum world for participants considering themselves a member of the Republican or Democratic party.

5. Discussion

In this paper, we provide experimental evidence that inequality is more accepted when payoffs are independent and workers do not compete in a zero-sum environment. When two individuals compete for a single high outcome, on average 22% to 50% of the prize is redistributed to the losing person. Removing the zero-sum nature of the environment, and allowing both persons to win simultaneously, reduces redistribution by up to 14%. This pattern is observed in settings where performance matters for prize allocation. Furthermore, spectators condition the amount redistributed on the performance difference of the two workers. The larger the performance difference, the larger the difference in allocated payments. Notably, this is not constant across treatments. Without a zero-sum environment, performance differences matter significantly less. A common finding in the literature is that inequality based on merit is perceived as fair (e.g., Almås et al., 2020; Andre, forthcoming). This effect is typically documented in studies that employ zero-sum environments. In light of our findings, the observed pattern may partially stem from this usage of zero-sum environments and be weaker in other environments, where payoffs are independent.

In a representative survey conducted in the US, we corroborate our experimental results. We observe a similar shift in redistributional choices when moving from a zero-sum setting to a setting where both workers potentially gain a prize. We are thus able to document the prevalence of such redistributional preferences in two culturally different societies, namely Germany and the US.

[15] We do not use names, but only first letters to avoid any gender effects.
[16] For a detailed description of these measures, please refer to Appendix C.2
[17] All these observations are robust to controlling for the specific setting seen in each scenario, the order of the scenarios, and the decision round, as reported in Columns (2) and (4).

We identify one important feature that particularly causes higher redistribution in zero-sum environments with the additional mechanism treatment Randomness – Chance Competition. In zero-sum environments, inequality is guaranteed. Moreover, payoffs are interdependent: the performance of one worker influences the chances of success of the other. Our results indicate that the former, the guaranteed inequality, has a larger influence on redistribution decisions than the interdependence of payoffs itself.

These findings reveal that people do not solely focus on the realized inequality in their redistribution decision; rather, they also consider counterfactual states that are possible ex ante, regardless of their actual realization. Accordingly, once payoffs are independent, spectators seem to include the possibility that both workers could have won simultaneously in their redistribution decisions. Conversely, when only one worker can win in the zero-sum environment, the winner's high income is perceived as being taken away from the loser. Our analysis of the low performer winning in the Randomness setting, where the outcome is unmerited, suggests that participants are less inclined to intervene when payoffs are independent, and the high performer could have won a prize, irrespective of the outcome of the low performer. This additional chance for the high performer appears to partially compensate for the low outcome.

This observation is not consistent with existing models of social preferences that incorporate fairness notions into the utility function but solely consider inputs and outcomes (e.g., Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000; Charness and Rabin, 2002). These models do not regard the underlying payoff-generating mechanisms and hence do not incorporate the interdependence of payoffs into the utility functions. Fudenberg and Levine (2012) and Saito (2013) extend the above mentioned models to uncertain outcomes, for instance lotteries, by incorporating expected utilities into their models. Even though this enables the consideration of multiple states, this is still an ex ante view: only states that still can be realized are factored in. When assessing final outcomes, the counterfactual states are no longer considered. Our findings demonstrate that these unrealized states indeed matter for redistributional preferences, suggesting a broader behavioral mechanism currently missing from the theoretical literature on social preferences.

Our results indicate a novel channel through which the perception of the societal environment might shape institutions. The belief about the world being zero-sum or not may affect the demand for redistribution and the size of the social-welfare system. This complements Alesina and Angeletos (2005), who document a correlation of social spending with beliefs about the importance of luck and effort for income across countries. Furthermore, as discussed by Frank and Cook (1996) and Frank (2016), technological change and the growing 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 inequality with regard to earnings.

In this regard, our findings are not only relevant for abstract beliefs about the interdependence of earnings and optimal redistribution levels in society, but may also impact wage setting 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. This may explain the ambiguous effect of forced ranking schemes on individual performance observed by Berger et al. (2013). Moreover, Cassar and Klein (2019) show that experiencing a loss in a tournament subsequently induces individuals to redistribute more in a similar situation. Over time, zero-sum environments may decrease the willingness of employees to exert effort. Conversely, employees may be more willing to accept unequal pay if advanced positions are not externally limited and bonus pools are flexible. That would allow firms to set steeper incentives or even reduce overall payment.

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 – affects political attitudes towards redistribution. Thus, informing people about the actual interdependence of payoffs can also have major consequences for these attitudes.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.jpubeco.2025.105320.

Data availability

Data will be made available on request.

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