Journal of the Economic Science Association (2025), **11**, 233–243
doi:10.1017/esa.2025.10021

ORIGINAL PAPER

Property rights and public goods

David C. Kingsley[1] and Lawrence R. De Geest[2,3]

[1]Department of Economics, University of Massachusetts Lowell, Lowell, MA, USA
[2]Lyft, San Francisco, CA, USA
[3]Department of Economics, University of San Francisco, San Francisco, CA, USA
Corresponding author: David C. Kingsley; Email: david_kingsley@uml.edu

(Received 8 April 2025; revised 2 June 2025; accepted 5 September 2025; first published online 5 December 2025)

Abstract
Legitimizing property rights over the resources that participants use in dictator and ultimatum games has been shown to significantly alter behavior. However, a similar impact has not been observed in public good experiments. We employ an interior public good design with thirty periods of peer punishment, which allows groups to choose between plausible contribution norms without conflicting with efficiency. Across our *Unearned* and *Earned* treatments, endowments are randomly allocated or earned through a real effort task. In *Unearned*, both *High* and *Low* types adhere to a norm of contributing an equal proportion of one's endowment. In contrast, in *Earned*, only *Low* types adhere to the proportional contribution norm, while *High* types contribute less than an equal proportion. Notably, deviations from the proportional contribution by *High* types are punished significantly less in *Earned*, suggesting a greater tolerance to such deviations when property rights are earned.

Keywords: cooperation; earned endowments; income inequality; public goods; punishment

JEL Codes: C92; H41; D82

1. Introduction

Legitimizing property rights over the resources that participants use in economic experiments, rather than distributing the resources randomly, has been shown to significantly affect behavior. For example, in dictator games (DGs), when the pot to be divided is provided by the experimenter, mean offers range between 20% and 30% (Camerer, 2003, Engel, 2011). However, when the dictator earns the pot, offers are significantly lower (Cherry *et al.*, 2002). Oxoby and Spraggon (2008) confirm that dictators are less generous when they earn the pot and, notably, that offers are approximately 50% when the receiver earns it. Finally, when both the dictator and the receiver jointly produce the pot, offers tend to be proportional to one's production (Konow, 2000, Frohlich *et al.*, 2004, Cappelen *et al.*, 2007).

Similar results have been observed in ultimatum games (UGs) where the receiver has the opportunity to accept or reject the proposer's offer. When the pot to be divided is a windfall, the modal offer is an even split, as proposers anticipate that lower offers will be rejected (Guth *et al.*, 1982, Henrich *et al.*, 2004). In contrast, when the pot is jointly produced, offers are proportional to one's production (Barber IV & English, 2019). The authors suggest that in the absence of any legitimate claim to the pot to be divided, an even split is the expectation. However, proportionality dominates equality once the pot is jointly produced.

© The Author(s), 2025. Published by Cambridge University Press on behalf of the Economic Science Association. This is an Open Access article, distributed under the terms of the Creative Commons Attribution licence (http://creativecommons.org/licenses/by/4.0), which permits unrestricted re-use, distribution and reproduction, provided the original article is properly cited.

These results demonstrate the importance of norms in the emergence and maintenance of social behavior. We refer to norms as behavioral rules based on shared expectations between individuals about what is appropriate in a given situation (De Geest & Kingsley, 2021, Vostroknutov, 2020, Fehr & Schurtenberger, 2018, Coleman, 2000, Coleman, 1990, Elster, 1989).[1] Further, norms have been shown to be context dependent, suggesting that behavior deemed appropriate may vary across strategically equivalent settings (Krupka & Weber, 2013). Thus, while altering the legitimacy of resources used in experiments does not alter the material incentives of subjects, they can alter the norms that subjects find appealing and thus choose to enforce, and in turn alter subject behavior. However, there is less evidence of a similar effect of earned property rights within public good games (PGGs). In voluntary contribution mechanism (VCM) designs, earned endowment heterogeneity has not been shown to significantly impact behavior. Both Cherry *et al.* (2005) and Spraggon and Oxoby (2009) used the number of correctly answered Graduate Management Admission Test (GMAT) questions to determine the distribution of endowments within linear, single-shot, VCM designs. Although there are slight variations across their experimental designs, neither report any significant variation in contributions across groups with earned or unearned endowments.

Here, we investigate the impact of earned and unearned endowment heterogeneity when group members are able to use sanctions to enforce contribution norms.[2] The introduction of peer punishment into linear PGGs with unequal and unearned endowments has been shown to increase contributions, as groups are able to enforce an efficient, contribute-your-endowment norm (Reuben & Riedl, 2013, De Geest & Kingsley, 2021).[3] However, linear PGGs are unique. Because the social optimum and Nash equilibrium are boundary solutions – contribute your entire endowment, or contribute nothing – behavior consistent with efficiency coincides with payoff equality, regardless of endowment heterogeneity.[4] The normative appeal of efficiency and payoff equality is intuitive and deviations are easy to observe, making it an appealing norm to enforce.[5] Further, linear PGGs create a conflict between a preference for efficiency, and any competing norm that would recognize legitimate claims created by earning one's endowment. Groups that choose to adopt any norm beyond contributing one's entire endowment must also accept a loss of efficiency. This detail stands in stark contrast to dictator and ultimatum games, where any distribution of the resources to be divided remains efficient.

To address this constraint of the linear PGG, we study earned property rights in a nonlinear PGG. In this design, the social optimum and Nash equilibrium lie in the interior of the choice space, allowing groups to maximize group earnings across any number of contribution patterns. In particular, our design produces three appealing patterns of contributions (*Equal Contributions*, *Equal Proportions*, and *Equal Earnings*), each of which may act as a focal point enabling groups to coordinate behavior (Schelling, 1960, Young, 2008, Krupka & Weber, 2013). Each of these contribution patterns maximizes group earnings but differs in how the benefits of cooperation are distributed, creating a possible tension between one's individual distributive preferences and sustaining cooperation. By removing the efficiency cost across these opposing contribution patterns, this design allows us to more clearly observe whether earned property rights alter behavior in PGGs. Note that, following Reuben and

[1]More formally, Bicchieri (2006) defines a norm as a behavioral rule that an individual knows applies to a given situation and prefers to conform to on the condition that: (a) there is an expectation that others will conform (an empirical expectation) and (b) others expect them to conform and may be willing to sanction deviations from the rule (a normative expectation).

[2]In the absence of punishment, the contributions of high- and low-endowment members decrease toward free-riding and therefore converge, often resulting in low endowment members contributing a higher proportion of their endowment, relative to high-endowment members (Buckley & Croson, 2006, Reuben & Riedl, 2013, Kingsley, 2016).

[3]Reuben and Riedl (2013) also show that groups that did not achieve full efficiency enforced a proportional contribution norm.

[4]Efficiency requires that each group member contribute their entire endowment. Note that throughout the paper, efficiency will refer to the maximum sum of group earnings.

[5]Effectively coordinating around a norm allows groups to properly "price" individual behavior using peer sanctions to mitigate the incentive for non-cooperation (De Geest & Kingsley, 2021).

https://doi.org/10.1017/esa.2025.10021 Published online by Cambridge University Press

Riedl (2013), we will refer to a contribution pattern that is identified as normatively appealing and observed in the data as a contribution norm.

In our *Unearned* condition, endowments are randomly allocated across participants and in our *Earned* condition, endowments are earned using a paid slider task (Gill & Prowse, 2019). In *Unearned*, we observe that both types adhere to a norm of contributing an equal proportion, of their endowment. However, in *Earned*, only *Low* types adhere to contributing an equal proportion while *High* types deviate and contribute less than an equal proportion. To understand this pattern we estimate the punishment received as a function of one's deviation from the proportional contribution. We observe that deviations from a proportional contribution among *High* types are punished less severely in *Earned* relative to *Unearned*.

Results indicate that *High* types who earned their high endowment – despite deviating from the proportional contribution norm – received less punishment than those with an unearned endowment. This suggests that groups become more tolerant of deviations, from this proportional norm, when property rights are earned. This is consistent with findings that inequality is more acceptable when attributed to effort rather than luck (Almås *et al.*, 2020) and motivates additional research to understand how unequal groups reconcile individual distributive preferences while maintaining cooperation in social dilemmas.

2. Design

Each treatment included two parts, which were preceded by a real effort task, as described below. Each participant was randomly assigned to a group of four, which remained the same throughout the experiment. In each group, two members (*High* types) received an endowment of 70 *Experimental Dollars* (EDs) and two members (*Low* types) received an endowment of 30 EDs. Group members received the same endowment each period; once a *High* type, always a *High* type. Participants could earn EDs each period. Each participant received a $7 participation payment, and their total EDs were converted to US dollars such that 150 EDs = $1.

Each treatment was preceded by a paid slider task similar to Gill and Prowse (2019). Each slider included a small marker that could be positioned along the slider at any point, ranging from 0 on the left to 100 on the right. During the 2-minute slider task, participants had a set of 50 sliders on their screen, and earned 2 EDs for each slider placed exactly at 50.[6] Across treatments, the slider task would either determine, or not, the allocation of the endowments. In our *Unearned* treatment, the slider task was completed but the allocation of individual endowments was random. In our *Earned* treatment, the two group members who earned the most during the slider task received the 70 ED endowment and the other two members received the 30 ED endowment.[7]

2.1. Part 1

Part 1 includes three periods of a voluntary contribution mechanism and is designed to introduce the incentives of the experiment prior to introducing peer punishment. Each participant is asked how many EDs, from their endowment, they would like to allocate to a group account. Individual payoffs are described as follows:

$$\pi_i = (e_i - x_i) + \frac{1}{n}\left(a\sum_{j=1}^{n} x_j - b\left(\sum_{j=1}^{n} x_j\right)^2\right)$$

[6]Prior to the 2-minute paid task, each participant was able to gain experience with the task in a 30-second practice round. In order to minimize the likelihood of ties we used a continuous scoring rule such that subjects earned less the further their slider was from 50 (De Geest *et al.*, 2022). For example, a slider placed 10 marks away from 50 (i.e., at 40 or 60) would earn 1.6 EDs, and a slider placed 20 marks away (i.e., 30 or 70) would earn 1.2 EDs.

[7]Each group member only observed their own earnings from the slider task and their rank within their group.

https://doi.org/10.1017/esa.2025.10021 Published online by Cambridge University Press

where e_i is the member's endowment and x_i is their allocation (contribution) to the group account. The right hand side of the expression represents each participants' earnings from the group account (the PG), with $a = 6$ and $b = .025$.

There is no unique Nash equilibrium with this payoff function, but individual best responses suggest that individual earnings are maximized when one equates the cost of allocating one of their EDs to their individual return from the public good (i.e., $\frac{1}{n}\left(a - 2b\left(\sum x_j\right)\right) = 1$). This condition holds when $\sum x_j = \frac{a-n}{2b} = 40$ EDs, suggesting that each individual has an incentive to contribute to the group account whenever there are fewer than 40 EDs allocated in aggregate. Nash equilibria can thus be expressed as $x_i = \max\left[0, \frac{a-n}{2b} - \sum x_{-i}\right]$. As such, the symmetric Nash equilibrium implies that each group member contributes 10 EDs to the group account.

Similarly, there is no unique social optimum but following the logic above it can be determined that group earnings are maximized when $\left(a - 2b\left(\sum x_j\right)\right) = 1$. This condition equates the group return to the individual cost of allocating and holds when $\sum x_j = \frac{a-1}{2b} = 100$ EDs. Therefore, any pattern of contributions such that 100 EDs are allocated to the group account will maximize group earnings. Importantly, when interacted with endowment heterogeneity, this feature allows groups to maximize group earnings in a variety of ways and gives groups the capacity to choose how the benefits of cooperation are distributed. That is, by varying how much *High* and *Low* group members contribute toward the the PG, groups are able to determine the distribution of earnings.

Normative analysis of distributive preferences often deploy a variation of a DG with a preceding production phase where each participants' individual production is combined to generate the pot to be divided and focuses on equality and equity (Konow, 2000, Frohlich *et al*., 2004, Cappelen *et al*., 2007).[8] Adapting the principles of equality and equity to the PG presented here allows us to create three normatively appealing patterns of contributions that may serve as focal points.[9] Each of these focal points, which define a specific contribution from each type, may serve as a potential norm and is summarized in Table 1. Note that, in what follows we will reserve the term, norm, or contribution norm, to suggest a normatively appealing pattern of contributions that is observed in the data. The *Equal Contributions* benchmark suggests that each member should contribute 25 EDs to the group account and maintains an earnings difference between *High* and *Low* group members (132.5 EDs vs. 92.5 EDs). The *Equal Earnings* benchmark requires *High* types to allocate 45 EDs and *Low* types to allocate 5 EDs but equates their earnings at 112.5 EDs each period. Finally, the *Equal Proportions* benchmark splits the difference and requires each type to allocate half of their endowment. If earned endowments impact behavior within PGGs similarly to how they impact behavior in dictator and ultimatum games, we would expect a greater emphasis on equality in *Unearned* and on equity in *Earned*.

The instructions included tables showing participants how earnings varied across the range of possible allocations. Comprehension questions asked participants to solve for individual and group earnings at the *Equal Contributions* and *Equal Earnings* benchmarks to ensure this tension was recognized. These comprehension questions were checked prior to the start of the experiment to ensure that participants understood the payoffs.[10] At the end of each period of Part 1, each participant was

[8]Equality refers to equalizing material payoffs regardless of one's production (referred to as *egalitarian* in Frohlich *et al*. (2004) and *strict egalitarian* in Cappelen *et al*. (2007)). Equity refers to what is considered fair and, in these experiments, typically refers to an allocation of the pot proportional to one's production (referred to as *the accountability principle* in Konow (2000), *just deserts* in Frohlich *et al*. (2004), and *liberal egalitarian* in Cappelen *et al*. (2007)).

[9]Following Reuben and Riedl (2013), who show that heterogeneous groups find efficiency normatively appealing, we only consider efficient patterns of contributions as potential focal points.

[10]Given the complexity of the design, we opted to explicitly show these potential focal points to ensure participants understood how to maximize group earnings and how their choices determined the distribution of individual earnings. Results do not suggest that these comprehension questions anchored participants toward these contribution patterns.

https://doi.org/10.1017/esa.2025.10021 Published online by Cambridge University Press

Table 1 Contributions and earnings for *Low*- and *High*-endowment group members

	Low endowment		*High* endowment	
	Contribution	Earnings	Contribution	Earnings
Symmetric Nash	10	70	10	110
Equal Contributions	25	92.5	25	132.5
Equal Proportions	15	102.5	35	122.5
Equal Earnings	5	112.5	45	112.5

shown their allocation to the group account, the total allocation to the group account, their period earnings, and their total earnings (the sum of their period earnings).

2.2. Part 2

Part 2 includes thirty periods and adds a punishment stage immediately following the allocation decision. Groups remained fixed across Part 1 and Part 2 (partner design). During the punishment stage, in addition to the information provided during Part 1, each participant was shown the individual allocations and corresponding endowments of each, other, group member (displayed in random order each period). Each group member was then given the opportunity to impose up to 10 reduction points upon each other group member. Each reduction point assigned a cost of 1 ED and each reduction point received a cost of 3 EDs.

3. Results

Data was collected at the UMass Amherst Cleve E. Willis Laboratory in April and October 2022. In total, 116 participants participated across 14 groups in *Unearned* and 15 groups in *Earned*, giving us a total of 3,944 individual observations. Each session lasted approximately 75 minutes, and average earnings (the sum of their period earnings, including the slider task) were $20.41 plus a $7 show-up payment. We discuss our results from Part 2 in three sections: contributions, punishment, and earnings.[11]

3.1. Contributions

Table 2 shows average contributions overall and by endowment across conditions. Figure 1 shows the distribution of contributions in Panel A and the time series of average contributions in Panel B. In each panel, the dashed line indicates a proportional contribution (15 EDs for *Low* and 35 EDs for *High*).[12]

The data suggest that contributions among *Low* types are similar across conditions. Both the average contributions (14.03 vs. 13.82) and the medians (14 in *Unearned* and 15 in *Earned*; see Figure 1) closely match the proportional contribution of 15 EDs. Moreover, the time series indicates that these contributions remained stable across all 30 periods. In contrast, *High* types display more variability in their average contributions (34.16 vs. 30.29), although the medians (35 in *Unearned* and 33 in *Earned*) are closer to the proportional contribution of 35 EDs. The time series reveals that in the *Unearned* condition, average contributions for *High* types consistently hover around 35 EDs, whereas in the *Earned* condition, they remain below 35 EDs throughout.

[11] Results from Part 1 are shown in the Appendix. The code to replicate our results can be found at https://github.com/lrdegeest/PropertyRightsPublicGoods.

[12] Time series of individual member contributions for each group are available in the online supplementary materials.

https://doi.org/10.1017/esa.2025.10021 Published online by Cambridge University Press

Table 2 Average contributions overall and by endowment across conditions. Standard deviations in parentheses

	Average Contributions	
	Unearned	*Earned*
Overall	24.09	22.06
	(13.86)	(14.08)
Low	14.03	13.82
	(5.86)	(7.72)
High	34.16	30.29
	(12.14)	(14.19)

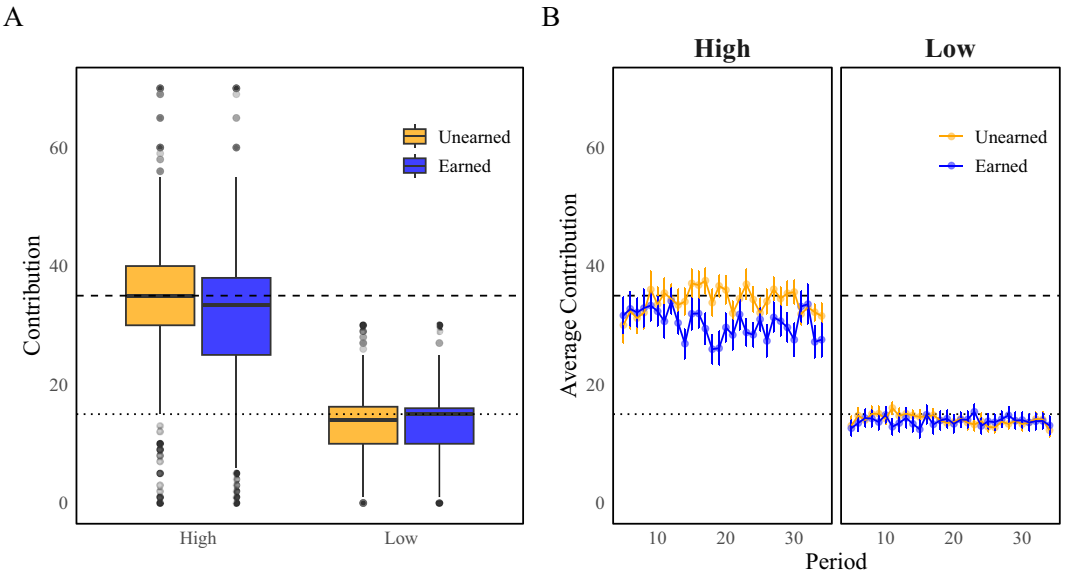


Fig. 1 Panel A: Distribution of contributions. Panel B: Time series of average contributions with standard errors. In both panels the dashed and dotted lines mark the respective proportional contribution for *High* and *Low* types, respectively

To investigate the effect of earned property rights, we first compare average group contributions, by type, to the proportional contribution benchmarks (15 EDs for *Low* and 35 EDs for *High*).[13] In each condition, *Low* types conform to the proportional norm. Average group contributions among *Low* types do not significantly differ from 15 EDs in *Unearned* (Wilcoxon rank-sum: $p = .241$) or in *Earned* (WSR: $p = .359$). However, we observe that adherence to the proportional contribution (35 EDs) among *High* types varies by condition. In *Unearned*, average contributions are consistent with the benchmark; we are unable to reject adherence (WSR: $p = .583$). In *Earned*, average contributions significantly differ from 35 EDs (WSR: $p = .022$), rejecting the hypothesis that *High* contributed the proportional norm on average.

[13]Within condition, we employ one-sample Wilcoxon signed-rank (WSR) tests conducted at the group level (14 observations in *Unearned* and 15 in *Earned*). We only test for differences from the proportional benchmarks since the descriptive data suggests that average contributions are closest to these values.

https://doi.org/10.1017/esa.2025.10021 Published online by Cambridge University Press

Table 3 Average punishment sent and received overall and by endowment across condition. Standard deviations in parentheses

	Punishment Sent		Punishment Received	
	Unearned	*Earned*	*Unearned*	*Earned*
Overall	2.58	1.98	7.75	5.95
	(3.66)	(3.43)	(12.76)	(11.01)
Low	2.79	2.21	5.37	4.88
	(3.85)	(3.66)	(8.50)	(10.53)
High	2.38	1.75	10.14	7.01
	(3.44)	(3.17)	(15.56)	(11.38)

Further, we compare average group contributions, by type, across conditions.[14] We observe no significant differences across conditions; overall (WSR: $p = .484$), among *Low* types (WRS: $p = .660$), or among *High* types (WRS: $p = .234$). While the lack of significance across *Low* types is unsurprising given the observed difference (0.21 EDs), the null result across *High* types may reflect limited statistical power to detect the modest difference observed (3.87 EDs).[15] While we are unable to claim a significant difference across conditions, we conclude by emphasizing that only *High* types in *Earned* significantly deviate from the proportional contribution. Next we investigate whether earned property rights effected the deployment of punishment and whether this may explain the variation observed among *High* types.

3.2. Punishment

Table 3 shows average punishment, sent and received, overall and by endowment across conditions. In aggregate, across all contributions, there is no significant difference across conditions: in punishment sent overall (WRS: $p = .354$), across *Low* (WRS: $p = .348$), or across *High* (WRS: $p = .377$); or in punishment received overall (WRS: $p = .354$), across *Low* (WRS: $p = .337$), or across *High* (WRS: $p = .275$).

However when we consider the punishment received based on one's contribution, we observe that earned, property rights shaped enforcement. Figure 2 presents the average punishment received based on one's binned contribution. Among *Low* types, the amount of punishment received is similar across contributions. Among *High* types, we observe substantially more punishment received once their contribution falls below 30 EDs in *Unearned*. This suggests that deviations among *High* types were treated differently across conditions.

To better understand how earned endowments effected participants' deployment of punishment, we estimate the punishment received given the deviation of one's contribution from the proportional norm. We calculate the positive deviation and absolute value of the negative deviation of contributions from 15 EDs for *Low* and from 35 EDs for *High*. We then estimate a subject fixed effects model to predict the amount of punishment received by each endowment type, in each condition, with respect to the observed deviation.

The results presented in Table 4 suggest that punishment is deployed similarly across treatments. In both conditions, deviations above the proportional norm are not targeted while deviations below the

[14] Across conditions, we employ Wilcoxon rank-sum (WRS) tests, also conducted at the group level. Note that all WRS test results were confirmed with regression analysis using subject random effects with errors clustered at the group level. While omitted from the text for clarity, the analysis is available in the supplementary online materials.

[15] We estimated the power (ex-post) of the means test across *High* types. The estimated power (0.29) suggest we are underpowered and indicates that the minimal detectable effect size in this data is 7.2 EDs.

https://doi.org/10.1017/esa.2025.10021 Published online by Cambridge University Press

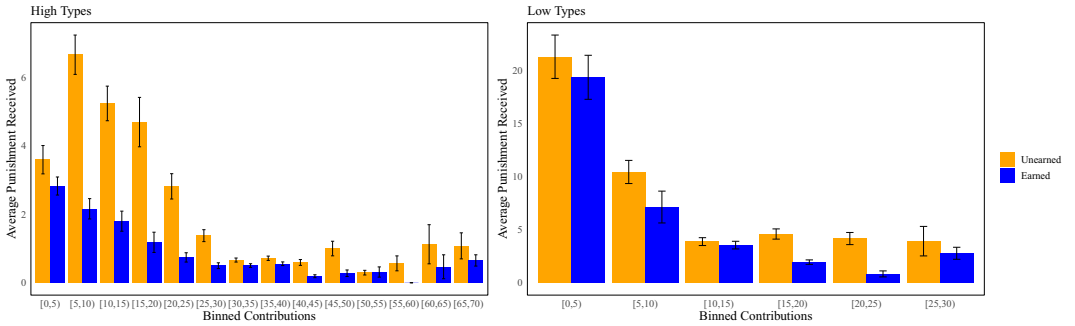


Fig. 2 Average punishment received by type, across conditions, based on one's binned contribution

Table 4 Subject fixed effects with standard errors clustered at the group level. Robust standard errors in parentheses

	Dependent variable: Punishment received	
	Low	*High*
Positive deviation X *Unearned*	0.118	-0.001
	(0.178)	(0.1)
Positive deviation X *Earned*	0.102	-0.04
	(0.305)	(0.072)
Negative deviation X *Unearned*	1.08***	1.004***
	(0.112)	(0.1)
Negative deviation X *Earned*	1.527***	0.528***
	(0.43)	(0.127)
Constant	0.839	4.381***
	(0.923)	(0.616)
N	1740	1740
R^2	0.193	0.36
Prob > *F*	0	0

norm are. *Low* types are similarly punished across conditions, receiving an average of 1.08 and 1.53 EDs in punishment for each ED less than 15 that they contribute. At the mean negative deviation, the marginal effect of this difference is insignificant ($p = .421$). In contrast, there is a notable reduction in the punishment received by *High* in *Earned*. *High* types receive an average of 1.00 EDs in *Unearned* and 0.53 EDs in *Earned* for each ED for which their allocation falls below 35. The marginal effect of this difference, at the mean negative deviation, is significant ($p < .01$). Group members in *Earned* appear to be more tolerant of deviations from the proportional norm by *High* types. Consistent with the observation that only *High* types in *Earned* deviate from the proportional contribution, this suggests that earned property rights lessened the expectation that *High* types adhere to the proportional norm.

3.3. Earnings

Table 5 shows average period earnings overall and by endowment across conditions. Given the similarity in contributions and punishment across conditions, it is unsurprising that earnings are also similar. Earnings are statistically equivalent across treatments: overall (WRS: $p = .813$), across *Low*

https://doi.org/10.1017/esa.2025.10021 Published online by Cambridge University Press

Table 5 Average period earnings overall and by endowment across condition. Standard deviations in parentheses

	Average Earnings	
	Unearned	*Earned*
Overall	99.42	98.53
	(16.68)	(20.13)
Low	91.67	87.6
	(13.06)	(17.72)
High	107.18	109.46
	(16.31)	(16.07)

(WRS: $p = .591$), and across *High* (WRS: $p = .591$). Further, in both conditions, *High* types earn significantly more than *Low* types: *Unearned* (WSR: $p < 0.01$) and *Earned* (WSR: $p < 0.01$).

4. Discussion

This paper contributes to our understanding of how earned property rights impact behavior in PGGs. In contrast to the existing literature, our design considers inequality within an interior PG. The interior design allows groups to maximize group earnings across three normatively appealing patterns of contributions (*Equal Contributions*, *Equal Proportions*, and *Equal Earnings*). While each of these potential focal points maximizes group earnings, they vary how the benefits of cooperation are distributed across group members. Therefore, the design allows us to better understand how members within unequal groups balance their individual distributive preferences with maintaining cooperation in PG social dilemmas.

In the absence of any legitimate claim to one's endowment, in our *Unearned* condition, we observe that both *High* and *Low* types adhere to a norm of contributing half of their endowment. However, with earned property rights, in our *Earned* condition, only *Low* types adhere to this proportional norm while *High* types deviate and contribute less than an equal proportion of their endowment. To better understand this variation across *High* types, we consider how property rights shaped the use of punishment. We observe that *High* types who contributed less than an equal proportion of their endowment were punished significantly less in *Earned* relative to *Unearned*. This suggests that groups were more tolerant of deviations from the proportional norm, by *High* types, when they had a legitimate claim to their higher endowment. While we do not observe a significant effect of earned property rights on individual earnings, tolerating lower contributions from *High* types increases inequality.

These results are broadly consistent with research investigating differences in societal tolerance of income inequality. Almås *et al.* (2020) show that one's tolerance of inequality depends on the extent to which they attribute income differences to one's individual effort or merit versus their luck. Specifically, they state that the US tends to tolerate higher levels of inequality than Norway because Americans attribute differences in income to one's own effort or merit to a greater extent than Norwegians, who attribute differences more to luck. A similar effect has been observed in research looking at earned endowment heterogeneity in a linear PG with a formal mechanism which alters individual returns from the PG (Balafoutas *et al.*, 2013). The mechanism allows groups to determine how the earnings from the PG are distributed with respect to one's contribution. At one extreme, the earnings from the PG are distributed equally without regard to one's contribution and, at the other, the earnings are distributed proportionally to one's contribution. Groups in both their earned and unearned treatments chose to distribute the majority of earnings proportionally, effectively solving the social dilemma, but overall, and particularly among *Low* types, there was a significant increase

https://doi.org/10.1017/esa.2025.10021 Published online by Cambridge University Press

in proportionality when endowments were earned. As increasing proportionality reduces redistribution, this is consistent with a greater tolerance of inequality when endowments are earned. Indeed, Balafoutas *et al.* (2013) state that *Low*-endowment members cast votes as if they view inequality that disfavors them as being more acceptable when it is earned.

Future research is warranted to better understand how unequal groups solve the tension between individual distributive preferences and sustaining cooperation in public good social dilemmas.

Acknowledgements. The authors would like to thank participants at the 2022 Economic Science Association North American Meeting and the 2022 New England Experimental Economics Workshop for helpful comments. Funding from Suffolk University and the University of Massachusetts Lowell is gratefully acknowledged.

Declarations of interest. none.

Statements and Declarations. The authors declare no financial or non-financial conflicts of interest.

References

Almås, I, Cappelen, A. W., & Tungodden, B. (2020). Cutthroat capitalism versus cuddly socialism: Are Americans more meritocratic and efficiency-seeking than Scandanavians? *Journal of Political Economy*, *128*(5), 1753–1787.

Balafoutas, L., Kocher, M. G., Putterman, L., & Sutter, M. (2013). Equality, equity and incentives: An experiment. *European Economic Review*, *60*, 32–51.

Barber IV, B. S., & English, W. (2019). The origin of wealth matters: Equity norms trump equality norms in the ultimatum game with earned endowments. *Journal of Economic Behavior and Organization*, *158*, 33–43.

Bicchieri, C. (2006). *The grammar of society*. Cambridge University Press.

Buckley, E., & Croson, R. (2006). Income and wealth heterogeneity in the voluntary provision of linear public goods. *Journal of Public Economics*, *90*(4–5), 935–955.

Camerer, C. F. (2003). *Behavioral game theory*. Princeton University Press.

Cappelen, A. W., Hole, A. D., Sørensen, E. ø., & Tungodden, B. (2007). The pluralism of fairness ideals: An experimental approach. *American Economic Review*, *97*(3), 818–827.

Cherry, T. L., Frykblom, P., & Shogren, J. (2002). Hardnose the dictator. *The American Economic Review*, *92*(4), 1218–1221.

Cherry, T. L., Kroll, S., & Shogren, J. (2005). The impact of endowment heterogeneity and origin on public good contributions: Evidence from the lab. *Journal of Economics Behavior and Organization*, *57*(3), 357–365.

Coleman, J. S. (1990). *Foundations of social theory*. Harvard University Press.

Coleman, J. S. (2000). Social capital in the creation of human capital. In E. Lesser (Ed.), *Knowledge and Social Capital*. pp. 17–41 Elsevier.

De Geest, L. R., Kidwai, A. H., & Portillo, J. E. (2022). Ours, not yours: Property rights, poaching and deterrence in common-pool resources. *Journal of Economic Psychology*, *89*, 102452.

De Geest, L. R., & Kingsley, D. C. (2021). Norm enforcement with incomplete information. *Journal of Economic Behavior & Organization*, *189*, 403–430.

Elster, J. (1989). Social norms and economic theory. *Journal of Economic Perspectives*, *3*(4), 99–117.

Engel, C. (2011). Dictator games: A meta study. *Experimental Economics*, *14*(4), 583–610.

Fehr, E., & Schurtenberger, I. (2018). Normative foundations of human cooperation. *Nature Human Behaviour*, *2*(7), 458–468.

Frohlich, N., Oppenheimer, J., & Kurki, A. (2004). Modeling other-regarding preferences and an experimental test. *Public Choice*, *119*(1/2), 91–117.

Gill, D., & Prowse, V. (2019). Measuring costly effort using the slider task. *Journal of Behavioral and Experimental Finance*, *21*, 1–9.

Guth, W., Schmittberger, R., & Schwarze, B. (1982). An experimental analysis of ultimatum bargaining. *Journal of Economic Behavior and Organization*, *3*(4), 367–388.

Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., & Gintis, H. (2004). *Foundations of human sociality: Economic experiments and ethnographic evidence from fifteen small-scale societies*. Oxford University Press.

Kingsley, D. C. (2016). Endowment heterogeneity and peer punishment in a public good experiment: Cooperation and normative conflict. *Journal of Behavioral and Experimental Economics*, *60*, 49–61.

Konow, J. (2000). Fair shares: Accountability and cognitive dissonance in allocation decisions. *American Economic Review*, *90*(4), 1072–1091.

Krupka, E. L., & Weber, R. A. (2013). Identifying social norms using coordination games: Why does dictator game sharing vary?. *Journal of the European Economic Association*, *11*(3), 495–524.

Oxoby, R. J., & Spraggon, J. (2008). Mine and yours: Propoerty rights in dictator games. *Journal of Economic Behavior and Organization*, *65*(3–4), 703–713.

https://doi.org/10.1017/esa.2025.10021 Published online by Cambridge University Press

Reuben, E., & Riedl, A. (2013). Enforcement of contribution norms in public good games with heterogeneous populations. *Games and Economic Behavior*, *77*(1), 122–137.
Schelling, T. C. (1960). *The strategy of conflict*. Harvard University Press.
Spraggon, J., & Oxoby, R. J. (2009). An experimental investigation of endowment source heterogeneity in two-person public good games. *Economics Letters*, *104*(2), 102–105.
Vostroknutov, A. (2020). Social norms in experimental economics: Towards a unified theory of normative decision making. *Analyse & Kritik*, *42*(1), 3–40.
Young, H. P. (2008). Social norms. In S. N. Durlauf & L. E. Blume (Eds.) *The new Palgrave dictionary of economics*. vol. 7, 647–651. Palgrave Macmillan.

Cite this article: Kingsley, D. C., & De Geest, L. R. (2025). Property rights and public goods. *Journal of the Economic Science Association*, *11*(2), 233–243. https://doi.org/10.1017/esa.2025.10021

https://doi.org/10.1017/esa.2025.10021 Published online by Cambridge University Press