SHORT TITLE: Inequality, Transparency and Cooperation

LONG TITLE: Promoting Cooperation in an Unequal World: Experimental evidence on the Role of Transparency and Punishment

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Abstract

Across two studies, we examine the role of transparency and peer punishment in promoting cooperation and addressing economic inequality in public good contributions. With global inequality rising and the wealthiest few amassing a greater share of resources, its impact on social cohesion and business environments is increasingly significant. Financial secrecy further compounds these issues by allowing for income and wealth concealment at both societal and organizational levels. Our experimental findings reveal that transparency paired with peer punishment significantly boosts cooperation, particularly among advantaged individuals. In contrast, peer punishment alone proves insufficient to mitigate the adverse effects of inequality without the support of transparency. These results underscore the need for ethical governance structures that incorporate transparency, fairness, and accountability – principles essential for organizations committed to fostering trust and social responsibility in unequal settings.

Keywords: inequality, transparency, secrecy, public good, experiment.

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1. Introduction

The early 21st century witnessed an alarming rise in economic inequality – now one of the most pressing issues of our time (Piketty, 2014). According to a UK House of Commons library study, the top 1% of income earners are on track to control two-thirds of the world's wealth by 2030 (McGuinness and Harari, 2019). At the same time, regular employees' incomes have stagnated in real terms (Burri et al., 2020; Willman and Pepper 2020). Increasing economic inequality and income stagnation have fueled social unrest, such as the Occupy movement in 2011, the Yellow vests protest in 2018, and the rise of global populist movements (Hudson et al., 2022).

Inequality poses serious threats to social cohesion and trust, which are essential for the effective functioning of societies and business environments. Numerous evidence has documented the negative impact of inequality on businesses, such as the increased incidence of crime against firms in unequal societies (Krammer et al., 2023) or even within firms, on unequal HR practices and interpersonal relationships (Hudson et al., 2022).

Financial secrecy exacerbates inequality by enabling the very wealthy and corporations to conceal their wealth, thus shirking their corporate and/or social responsibilities (Alstadsæter et al., 2019; Shaxson, 2011; Shaxson et al., 2012; Zucman, 2015). At the organizational level, tools that claim to protect privacy, such as non-disclosure agreements and hidden pay scales, divide employees, intensifying the negative effects of inequality (Card et al., 2012).

Our study explores how transparency and punishment mechanisms can foster greater equality in economically disparate environments. We posit that these measures counteract the detrimental effects of inequality on social cooperation and public good contributions. Our research question is: How can transparency and peer punishment mitigate the negative impact of economic inequality on public good contributions? By examining this relationship, we aim to shed light on ethical pathways to promote fairness and social welfare. This investigation is particularly relevant for understanding how organizational and societal structures can cultivate more equitable outcomes, a key concern in business ethics.

We investigate this relationship using behavioral laboratory experiments, which have numerous advantages, including control, isolation of causality, and practical policy implications. This method is widely used in management research, including in business ethics (see e.g., Chan et al., 2023). Specifically, we implement a public good game (Isaac and Walker, 1988), which provides a framework to study complex social and ethical behaviors relevant to business contexts. First, it helps in understanding cooperation and contribution in scenarios where companies and employees contribute to shared resources, with individual efforts benefiting the entire organization. Additionally, this method allows for the study of free-riding within organizations, where individuals benefit from others' efforts without contributing much themselves. Finally, public good games can model situations with unequal resources or opportunities, reflecting real-world business environments where power imbalances or unequal pay exist. These experiments help explore how inequality impacts cooperation and ethical behavior.

We report on two studies, in which participants were sorted into groups of four and could contribute any part of their endowment to a public good. In both studies, participants' endowments depended on their performance in a real effort test. In the first study, participants were sorted into one of four treatments in a 2x2 design. The first dimension of the design was the source of inequality: in the MERIT treatment, all participants earned the same income per correct answer on a test; inequality here is simply a function of individual ability. In the MERIT+LUCK treatment, "Advantaged" participants earned three times more than the "Disadvantaged" participants per correct answer on the test. Inequality here both depends on merit as well as exogenous factors, which proxy societal factors like family wealth. We interacted these two treatments with the presence or absence of peer punishment: after contributions were revealed, participants could spend any part of their endowment or public good income to reduce the payoff of any group member. However, in the first 10 rounds in all four treatments, individual endowments were private information. Participants could only observe contributions, and therefore not know to what extent others were free-riding.

The results show that the asymmetric earning per correct answer caused substantial initial inequality in wealth. This inequality persisted and even increased in the MERIT+LUCK treatments, especially under conditions where participants could impose punishments. After the 10^{th} round of the experiment, we elicited participants' willingness-to-pay for secrecy of their own endowment: Advantaged participants demonstrated a higher willingness to pay to keep their endowments secret, likely driven by the desire to hide the role of luck rather than merit in determining their advantage. Finally, punishment had a negligible effect on reducing inequality, and wealth disparities (as measured by a group's Gini coefficient) grew over time.

In the second study, we more closely investigated the impact of transparency on contributions. We implemented a MERIT+LUCK treatment and a MERIT+LUCK Punishment treatment. For the first 10 rounds, all endowments were kept secret. After the 10th round, the endowments were automatically made public. The results show that public endowments significantly enhance the effectiveness of peer punishment in increasing contributions to the public good. Transparency primarily impacts advantaged participants, leading to higher cooperation in punishment treatments, but it has no effect when punishment is absent.

The structure of the paper is organized as follows: Section 2 offers a comprehensive review of the relevant literature surrounding the variables under consideration. Sections 3 and 4, respectively detail the methodology, experimental procedure and results of studies 1 and 2. Finally, Section 5 discusses the results and their broader implications at the societal, within-companies and between-companies levels. Section 6 concludes.

Wealth inequality, Punishment, Secrecy, and Willingness to Pay for Secrecy

Our study weaves together four intertwined threads of literature related to cooperation: wealth inequality, peer punishment, wealth secrecy, and willingness to pay for secrecy.

Wealth inequality has emerged as a crucial determinant of cooperation. As hinted in the introduction, the most unequal societies – as measured by the Gini coefficient – are also the most divided and are more likely to experience social unrests, such as the Occupy movement, the Yellow vests protests, or the #MeToo and #BlackLivesMatter movements (Hudson et al., 2022). Economic inequality undermines positive business environments, leading to increased crimes against firms (Krammer et al., 2023) and creating tensions within organizations through unequal HR practices and strained interpersonal relationships (Hudson et al., 2022).

Suchon and Théroude (2022) conducted a meta-analysis of 23 laboratory public good experiments that implemented unequal endowments among participants. They showed – in a sample of more than 6,000 participants, in 1,842 groups, and 57,102 contributions – that when there is inequality in a group of participants, individuals contribute less of their endowments. In addition to economic inequality, disparities in political power also affect cooperative behavior in public good settings: Bogliacino et al. (2023) highlights that participants having unequal decision-making power – mirroring real-world political inequality – can exacerbate tensions within groups and reduce cooperation.

H1: Higher inequality reduces public goods contributions.

Punishment (or the threat of punishment) is essential for cooperation. Indeed, Hobbes [1651] (2012) believed that in complex societies individuals are unable to arrange themselves into cooperative arrangements without the threat of punishment from the state. Hobbes argued that centralized punishment is necessary because decentralized peer punishment is unsustainable in the long term. However, more recent research (Guala, 2012) shows that human societies often rely on coordinated and "soft" punishment mechanisms, such as gossip or social exclusion, to promote cooperation. These informal social sanctions help contain the need for harsher, direct punishment and offer an alternative that reinforces cooperation in a less centralized manner.

Within organizations, the enforcement of ethical guidelines through punitive measures is essential for cultivating a culture of compliance and promoting ethical behavior (Treviño and Weaver, 2001). Research indicates that consistent punishment for unethical actions also helps maintain an ethical corporate culture (Treviño and Brown, 2004). Furthermore, corporate governance mechanisms that incorporate punitive actions are important for deterring unethical practices and ensuring that corporations uphold their social responsibilities (Arlen, 2012). The legal frameworks, such as those influenced by the Sarbanes-Oxley Act, have shown how increased severity in punishment can drive companies towards more ethical practices and stronger CSR commitments (Hess, 2007).

Some of the first studies in experimental social sciences also centered on how to protect the commons and the positive influence of punishment on cooperation (Fehr and Gächter, 2000a; Ostrom et al., 1992; see Balliet et al., 2011 for a meta-analysis). These studies have demonstrated that participants do not hesitate to reward cooperators and punish free-riders effectively (Fehr and Gächter, 2002). Specifically, in their meta-analysis, Suchon and Théroude (2022) found that the availability of punishment significantly mitigated the negative impact of inequality on cooperation. Kingsley (2016) adds to this understanding, demonstrating that peer punishment fosters cooperation only when groups share homogenous endowments, but its effectiveness diminishes in heterogeneous groups.

H2: Punishment mitigates the effect of inequality on contributions.

We investigate ***wealth secrecy*** first with respect to ***punishment***. Secrecy can obscure unethical activities, making it challenging to enforce punitive measures effectively. For instance, transparency in wealth can enable tax administrations to more easily prosecute evaders whose declared income does not align with their lifestyle. Literature on the effects of transparency on tax compliance suggests that reducing wealth secrecy encourages both individuals and firms to report their income more accurately to avoid punishment – whether social or financial (see, e.g., Bø et al., 2015; Coricelli et al., 2014; Hasegawa et al., 2013). In their meta-analysis, Suchon and Théroude (2022) noted that wealth disclosure or transparency was not considered in most of the experiments constituting their dataset. This omission is significant because wealth transparency could logically increase social comparison and foster cooperation for the public good, particularly when both peer and institutional punishment mechanisms are in place. To the best of our knowledge, only De Geest and Kingsley (2021) show that when information about endowments is incomplete, the effectiveness of peer punishment diminishes, as individuals may be unable to target non-cooperators accurately.

H3: Wealth secrecy deters the effect of punishment on contributions.

We also consider ***wealth secrecy*** with respect to ***inequality***. Wealth secrecy is defined as the practices and legal frameworks that allow individuals or entities to conceal their financial assets, income, and ownership from authorities often for the purposes of tax evasion, money laundering, or hiding illicit wealth (see e.g., Chambers, 2006; Karhunen et al., 2022). To illustrate its importance, the scatterplot in Figure 1 compares the Financial Secrecy Index 2022, provided by the Tax Justice Network, with the Gini coefficient from the World Bank (1960–2021) (Tax

Justice Network, 2022; World Bank, 2021). The Financial Secrecy Index broadly ranks countries based on their involvement in facilitating tax evasion and avoidance for individuals and firms (as exemplified by Chan et al., 2023). Specifically, the index is composed of two components: a secrecy score, which reflects the extent of financial secrecy allowed by the jurisdiction's laws, and a global scale weight, indicating the volume of financial services the jurisdiction provides to non-residents. The Gini coefficient is a synthetical measure of income inequality within a country. Our analysis demonstrates a strong positive correlation between the two variables, though we are unable to isolate the direction of causality.

The study of secrecy runs deep within business ethics literature (Wexler, 1987). Organizations have a strong incentive to avoid fully transparent pay scales, as this prevents employees from monitoring the salaries of others, particularly top management, while also allowing firms to cut wages when necessary (Brown et al., 2022; Clarke et al., 2024; Caulfield, 2021). A consequence of such practices is that they contribute to increasing inequality over time (see e.g., Elvira and Graham, 2002). In the lab, seminal public good games by Isaac and Walker (1985) and subsequent studies (De Geest and Kingsley, 2019; Hauser et al., 2021) have shown that contributions are higher when information about experimental wealth is complete, even though the relationship between transparency and cooperation is complex and context-dependent.

H4: Wealth secrecy amplifies the effect of income inequality on contributions.

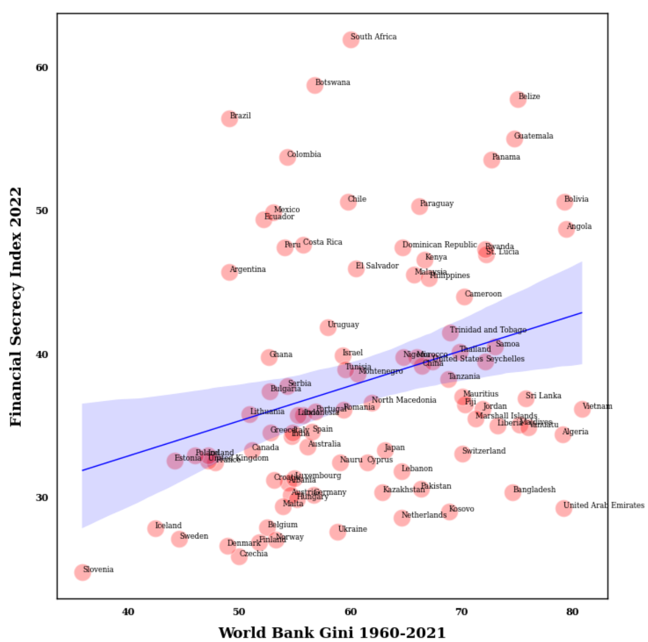

Figure 1: Financial Secrecy and Inequality. The data from the Financial Secrecy Index 2022 is sourced from the Tax Justice Network (2022). The World Bank Gini data for 1960-2021 is sourced from the World Bank (2021).

Willingness to pay to hide wealth is an understudied aspect of cooperative behavior, likely due to its secretive nature. The wealthiest individuals, multinational corporations, and organized crime groups are probably the most inclined to use complex financial structures such as offshore tax havens and shell companies to conceal their wealth (Zucman, 2015). This typically involves a fee paid to banks, law firms, and accountants that facilitate these transactions. Through these fee payments, wealthy actors reveal their explicit willingness to pay for financial secrecy. To the best of our knowledge, willingness to pay for secrecy has not been extensively examined in traditional lab experiments, with the exceptions of few lab-in-the-field experiments conducted in developing countries such as Liberia (Beekman et al., 2015), Senegal (Boltz et al., 2019), and Kenya (Jakiela and Ozier, 2016). These studies typically found that individuals often choose to hide income to avoid social obligations or requests from kin.

H5: Advantaged participants will have a higher WTP to hide their wealth than disadvantaged participants.

To summarize, our conceptual framework builds on four key themes: wealth inequality, peer punishment, wealth secrecy, and the willingness to pay for secrecy. We argue that wealth inequality undermines cooperation, as shown by both real-world evidence and experimental studies where unequal groups contribute less to public goods. While peer punishment can promote cooperation by imposing costs on free-riders, its effectiveness depends on transparency. When wealth can be hidden, punishment becomes less effective because unethical behavior – like tax evasion – becomes harder to detect and sanction. Moreover, the ability to conceal wealth amplifies inequality's corrosive effects on cooperation by obscuring true wealth distributions and eroding trust. This creates a self-reinforcing cycle, as wealthier actors are both more able and more willing to pay for financial secrecy to protect their advantages. This framework is represented in Figure 2.

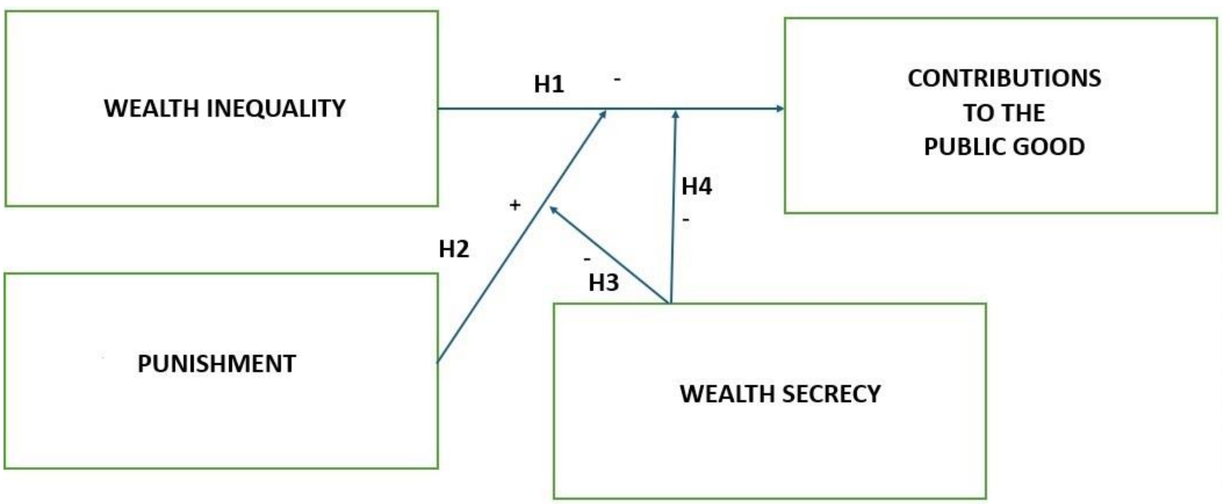

Figure 2: Conceptual Framework Diagram. The arrows indicate the direction of causality. The "+" and "-" sign represent a positive and a negative relationship, respectively.

Study 1

Methodology

Our experiment is based on a four-player linear public good game. Unlike the standard public good game where endowments are exogenous and equal, our participants earned their endowment through their performance in a real-effort task. After reading the instructions, participants answered a short comprehension questionnaire. Participants were not allowed to progress until they answered all questions correctly but could attempt the questions as many times as they wished. We then randomly sorted participants into either the MERIT treatment where all participants earned 1 token per correct answer or a MERIT+LUCK treatment, in which two participants earned 3 tokens per correct answer (the "Advantaged" participants) and the other two earned 1 token per correct answer (the

"Disadvantaged" participants). It was public information that the group could be composed of two Advantaged and two Disadvantaged participants.[1] We informed participants of their personal piece rate per correct answer.

Before the start of the experiment, participants had to correctly answer as many single-digit addition questions as they could in two minutes. The number of correct answers times their personal piece rate determined their endowment at the start of all the subsequent rounds of the public good game.[2] After the real-effort task finished, the screen revealed the participants' *own* endowment.

In this way, we generate inequality through two channels: merit, related to the ability of each participant to solve the puzzle task; and luck, related to the random assignment to Advantaged or Disadvantaged role.

In the first 10 rounds of the experiment, we did not inform participants of their group members' endowment, i.e., the endowment was private. We only told them the contributions of each group member and their own payoff. Before the beginning of the second 10 rounds, we elicited participants' willingness to pay to keep their endowment secret from the other three group members. To this effect, we implemented the Becker-DeGroot-Marshak mechanism (Becker et al., 1964). Participants could bid any amount between zero and their endowment. The computer randomly drew an integer value between 0 and the participant's endowment, following a uniform distribution. If the participant's bid was higher than the random draw, their endowment remained secret, but permanently reduced by the bid value. If the random draw was higher than the bid, that participant's endowment became public information.

We interacted the MERIT and MERIT+LUCK conditions with peer punishment. In the No Punishment treatment, participants played a standard linear public good game, where payoffs were given by equation (1). Player i's one period payoff π_i is determined by i's endowment E_i, her contribution to the public goods c_i and the share from the public goods $\sum_{j=1}^{4} c_j$. In the Punishment treatment, participants played a standard linear public good game with punishment (Fehr and Gächter, 2000b, 2002), where the marginal cost of punishment was constant and equal to 3. Equation (2) outlines the payoffs to players in this treatment. p_j^i represents the number of punishments point player j gives to player i. $3\sum_{j\neq i} p_j^i$ indicates the total punishment player i receives from all other players in the group. p_i^j is the punishment points given by player i to j and $\sum_{i\neq j} p_i^j$ accounts for the total punishment points given out by player i to j.

$$\pi_i = E_i - c_i + 0.4\sum_{j=1}^{4} c_j \tag{1}$$

$$\pi_i = max\{E_i - c_i + 0.4\sum_{j=1}^{4} c_j - 3\sum_{j\neq i} p_j^i, 0\} - \sum_{i\neq j} p_i^j \tag{2}$$

As per the standard literature on punishment, punishment points received could not lead to losses. However, punishment points assigned could. Figure 3 summarizes the timeline of the experiment.

[1] We used neutral language in all experimental materials. See the Instructions in Appendix A1.
[2] Participants first had a two-minute practice round to become familiar with the task.

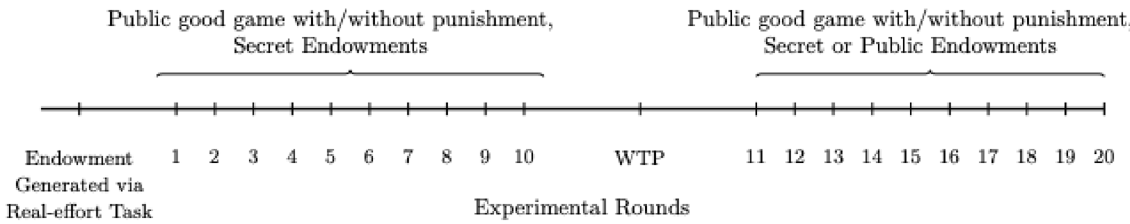

Figure 3: Timeline of Study 1. The x axis indicates the sequence of tasks that took place in Study 1

Experimental procedure

We collected between 5 and 7 groups of four participants for each session in each treatment (MERIT-Punishment, MERIT-No Punishment, MERIT+LUCK-Punishment and MERIT+LUCK-No Punishment), N = 440. Table 1 details the design of the study. The experimental software matched participants in groups of four at the start of the experiment, which remained the same thereafter (a 'partners' matching scheme). Participants were undergraduate students at the University of Exeter, who responded to an invitation through the lab's ORSEE recruitment system (Greiner, 2015). The experiment took place in the FEELE lab between February and March 2019. Upon completing the experiment, the software displayed their payment information. Each session lasted on average 30 minutes; the average payment was £6.26.[3]

Table 1: Experimental design - Study 1

Experimental condition	M-P	M-NP	M+L-P	M+L-NP
# of groups	27	28	28	27
# of participants	108	112	112	108

This table presents the treatment conditions in Study 1. The first row includes all conditions. The second row represents the number of groups and the number of participants in each of the corresponding conditions.

Results

Summary Statistics

Table 2 reports the descriptive statistics of the key variables. We divide our analysis in two parts. First, we will examine behavior in the first ten periods of the experiment, when individual endowments were unobservable. Then we will move to the main variable of interest: the willingness-to-pay for retaining secret endowments, which was estimated at the end of round 10. We will not look at the behavior of groups post-round 10 as revelation of endowment information is endogenous to preferences for secrecy. Therefore, we cannot make any causal claims on the effect of revelation of endowments on cooperation. We report p-values based on two-sided tests throughout.

Table 2: Summary Statistics – Study 1

	Merit-NoPun	Merit-Pun	Merit+Luck-NoPun		Merit+Luck-Pun	
			Disadv	Adv	Disadv	Adv

[3] The average payment was deflated by some participants who incurred losses in the experiment due to punishment spending. Such losses were deducted from their £3 show-up fee.

# of correct puzzles	35.93	38.12	35.56	34.46	37.30	37.05
	(8.83)	(8.58)	(8.15)	(8.33)	(8.09)	(9.94)
Endowment	35.93	38.12	35.56	103.39	37.30	111.16
	(8.83)	(8.58)	(8.15)	(25.00)	(8.09)	(29.81)
WTP for secrecy	0.14	0.17	0.15	0.16	0.17	0.22
	(0.18)	(0.20)	(0.22)	(0.22)	(0.20)	(0.23)
PG contributions (absolute)	11.65	24.29	15.06	16.73	22.86	36.65
	(10.31)	(11.45)	(12.28)	(17.64)	(11.84)	(31.43)
PG contributions (relative)	0.34	0.64	0.43	0.17	0.62	0.33
	(0.30)	(0.28)	(0.34)	(0.18)	(0.30)	(0.24)
Total PG contributions (relative)	0.34	0.64	0.30		0.48	
	(0.23)	(0.20)	(0.18)		(0.18)	
Payoffs	42.92	43.20	45.93	112.09	50.55	112.68
	(11.95)	(16.69)	(14.20)	(26.82)	(21.85)	(35.22)
Female %	56%	53%	69%	59%	63%	54%
Age	20.04	20.18	20.13	21.00	20.13	20.32
	(1.45)	(1.17)	(1.24)	(3.45)	(1.21)	(2.41)
Groups, participants, N	28, 112, 1120	27,108, 1080	27,108, 1080		28, 112, 1120	

Standard deviations in parentheses are calculated based on individual-period as the unit of observation, except Gini, for which SDs are calculated with group-period as the unit of observation.

We detect no statistically significant differences in the average number of puzzles solved between Advantaged and Disadvantaged participants in both Punishment (*t(110)* = 0.15, *p* = 0.884) and No Punishment conditions (*t(106)* = 0.69, *p* = 0.493).[4] However, the asymmetric piece rate resulted in dramatic differences in inequality at the start of the experiment, with groups in each of the Merit+Luck treatments exhibiting a Gini coefficient three times larger than groups in the comparable Merit treatment (No Punishment: *t(53)* = 11.18, $p < 0.001$; Punishment: *t(53)* = 8.48, $p < 0.001$). Furthermore, the Gini coefficient in the Merit treatments remained stable over time, while it roughly doubled in both Merit+Luck treatments (see Figure 4 below).

Note that in the linear public goods game, wealth inequality cannot easily increase. It can stay at the default value defined by participants' endowment levels if nobody contributes, or it can decline down to zero if all group members contribute their whole endowment, the proceeds of which are then equally divided among everyone. Inequality can only increase if (i) the wealthiest members free-ride relative to the poorest, and (ii) the wealthiest punish the poorest more than vice versa, particularly given the 3:1 punishment-to-cost ratio.

The average contribution data are consistent with inequality-increasing behavior in the Merit+Luck treatments. While (conditional on treatment) advantaged group members contribute more than disadvantaged group members

[4] This is consistent with evidence by Cardella and Roomets (2022). We observe a statistically significant difference in between Merit-No Punishment and Merit+Luck-Punishment (*t(214)* = -2.72, $p < 0.01$). No other pairwise comparison is significant at the 5% level.

in absolute terms, advantaged group members contribute a much smaller fraction of their endowment than the disadvantaged. As a result, the first condition for increasing inequality is met.[5] As a result, conditional on the punishment regime, we observe a decline in total relative contributions when we move from Merit to Merit+Luck (i.e., the total amount contributed divided by the sum of endowments). This decline is significant when punishment is available (-0.13, $\chi2(1)$ = 4.79, p = 0.029), but non-significant when punishment is unavailable (-0.04, $\chi2(1)$ = 0.68, p = 0.410). We therefore find evidence in favor of Hypothesis 1 and against Hypothesis 2, albeit only in the wealth secrecy domain.

The pattern of contributions over time is similar to that in the literature: declining contributions in the no-punishment treatments, and initially increasing contributions which then stabilize in the punishment treatments. The key difference between our results and the evidence on public good games with known endowments is that participants do not contribute their full endowments when punishment is available.

Despite the relative effectiveness of punishment and the ample endowments, players spent similar amounts on punishment irrespective of treatment or role. In Merit-Punishment, players spent on average 2.49 tokens on punishment points. In Merit+Luck-Punishment, Advantaged players spent 2.70 tokens while Disadvantaged players spent 2.67 tokens. No pairwise comparison of mean punishment was significant ($\chi2(1) \leq 0.07$, $p \geq 0.790$). Zero punishment accounted for 54% of cases, and 95% of cases had 11 punishment points sent to all three players in a given round (3.4 per player).

In short, the absence of information about endowments led to a reduction in the effectiveness of peer punishment as a disciplining device for cooperation. Advantaged players contribute a substantially lower fraction of their endowments than Disadvantaged players, who are unable to distinguish those who are unable to contribute more from those who are unwilling to contribute more. This absence of information about endowments resulted in large average payoff gains to the Advantaged, who earned more than twice what players in the comparable Merit treatments.

Willingness-to-pay for Secrecy

At the start of the 11th period of the experiment, participants were asked for their willingness to pay to maintain their endowments secret. A substantial proportion (25%) of participants stated a WTP of 0% of their endowment (see Figure B1 in Appendix) suggesting that a Tobit estimator is most appropriate.

Table 3 summarizes estimates from Tobit estimations with participants' WTP for endowment secrecy as the dependent variable. In estimation (1), the regressors are a set of treatment dummies (the omitted category is the Merit-NP treatment), the participant's endowment, a dummy for Advantaged participants and its interaction with Merit+Luck-P.

None of the coefficients on Merit+Luck-NP, Merit-P or Merit+Luck-P are significantly different from zero, suggesting that all else equal, participants in the Merit treatments and disadvantaged participants in the Merit+Luck treatments had a similar willingness-to-pay for secrecy. The coefficient on Advantaged is large and significant ($F(1,434)$ = 27.26, p < 0.0001), while the coefficient on Merit+Luck-P x Advantaged is positive but small and not

[5] Advantaged players contribute a steady proportion of their endowment over the course of the 10 periods; punishment leads to a 10pp contribution increase. With Disadvantaged players there is an upward trend in the punishment treatment, and a downward trend in the no-punishment treatment. This difference in trends suggests that punishment was most effective at promoting cooperation among Disadvantaged players but not Advantaged players. See Figure B1 in Appendix.

significant ($F(1,434) = 0.69$, $p = 0.406$), from which we can conclude that Advantaged participants had a higher willingness-to-pay for secrecy than Disadvantaged participants regardless of whether punishment was available or not. We find a small negative but significant coefficient on Endowment.

The positive effect of Advantaged combined with a negative effect on Endowment suggests two important psychological mechanisms at play: to the extent that Endowment is a function of effort in the real effort task, skilled participants are perhaps less willing to hide their wealth, since it is earned.[6] On the other hand, receiving a piece rate of 3 as opposed to 1 was a random outcome, and Advantaged participants are more willing to hide their "luck" than Disadvantaged participants. We further explore this idea by considering a third model where we have as regressors treatment dummies, the Advantaged dummy and *Effort*, which measures the number of correct answers in the real effort task, as well as its interaction with Advantaged. Including *Effort* instead of *Endowment* enables us to directly address the effect of merit without the confound of the different piece rate. We find both Advantaged and Disadvantaged participants are less willing to pay for secrecy the more skilled they are. However, that effect is significantly larger for Advantaged participants ($F(1,433) = 5.72$, $p = 0.017$), perhaps a form of motivated reasoning.

In short, we find support for Hypothesis 5: participants' willingness to pay for secrecy is higher among advantaged participants than disadvantaged participants. This effect is driven both by a desire to hide their luck while counteracted by their perception of merit, which is larger than that exhibited by Disadvantaged participants.

Table 3: Determinants of WTP for endowment secrecy

DV: Relative WTP	**(1)**		**(2)**		**(3)**	
	Coefficient	Robust SE	Coefficient	Robust SE	Coefficient	Robust SE
Merit+Luck-NP	-0.007	(0.041)	-0.044	(0.047)	-0.003	(0.045)
Merit-P	-0.059	(0.036)	-0.060*	(0.034)	-0.053	(0.038)
Merit+Luck-P	-0.059	(0.050)	-0.077	(0.053)	-0.051	(0.054)
Advantaged	0.414***	(0.079)	0.425***	(0.080)	0.282**	(0.127)
Merit+Luck-NP x Advantaged	0.054	(0.065)	-0.064	(0.064)	0.043	(0.073)
Endowment	-0.006***	(0.001)	-0.006***	(0.001)		
Effort					-0.003*	(0.002)
Effort x Advantaged					-0.007**	(0.003)
Equality			0.004	(0.005)		
Private			0.003	(0.006)		
Gov			0.008	(0.006)		
Hard work			0.004	(0.005)		

[6] This finding echoes some of the literature on earned vs. windfall incomes in experimental economics. Participants who earned their income may not make the same decisions as those who received it for free due to a sunk cost effect or a feeling of ownership. For example, Oxoby and Spraggon (2008), Engel (2011), and Korenok et al (2017) found that dictators who earned their pot to share were less likely to give in the dictator game, and they were also less likely to take from a deserving recipient who earned his money. Danková and Servatka (2015) find that second movers in the Taking Game are more likely to retaliate against first movers who take part of their endowment when it is earned than when it is given. In the power-to-take game, Bosman et al. (2005) find that all else equal, responders destroy less of their own endowment when it is earned than when it is given.

Zero Sum			0.001	(0.004)		
Private Info			-0.020***	(0.005)		
CEO Pay			0.0003	(0.005)		
Left-Right			-0.010	(0.006)		
Risk			0.006	(0.005)		
Stage 1 Merit Fair			-0.010**	(0.004)		
Multiplier Fair			-0.004	(0.004)		
Endowment Fair			0.002	(0.005)		
Constant	0.349***	(0.040)	0.412***	(0.081)	0.251***	(0.069)
N	440		440		440	

We report results with a Tobit estimation. Estimation (2) incorporates attitudinal measures, which we collected at the end of the experiment in the post-experimental questionnaire (for a full list of the variables, see Table B1 in the Appendix). Two variables have statistically significant correlations with WTP: personal views on whether income should be public or private (Private Info) and perceptions of the role of merit in determining the endowment (Stage 1 Merit Fair). Both are negative and highly significant. The interpretation of both is as expected: the more people believe individuals' income should be made public the lower WTP is; the higher the perceived merit in the endowment determination, the lower the WTP. ***: $p<.001$; **: $p<.01$; *: $p<.05$

Inequality

We next examine the effectiveness of punishment in reducing inequality. Note that in the linear public goods game, wealth inequality cannot easily increase: it either stays at a default value defined by participants' endowment levels, or it can decline down to zero if all group members contribute their whole endowment. Inequality can only increase in the highly unlikely event that the wealthiest members free-ride, the poorest contribute, and the wealthiest punish the poorest by more than vice versa.

Figure 4 plots the average Gini coefficient for each treatment; the variable we use to determine the Gini coefficient is the cumulative earnings for each participant in a given period.[7] First, punishment has no effect on the Gini coefficient: if anything it slightly reduces the Gini coefficient in the Inequality conditions. Second, the Gini coefficient increases over time markedly in both Merit+Luck treatments. By the 10th round, the Gini coefficient had increased by 0.1 in Merit+Luck-No Punishment ($\chi 2(1) = 344.46$, $p < 0.0001$) as well as in Merit+Luck-Punishment ($\chi 2(1) = 69.34$, $p < 0.0001$). In the Merit treatments the time trend is much less marked, but still positive: the Gini coefficient had increased by 0.035 by the 10th round in both Merit-No Punishment and Merit-Punishment ($\chi 2(1) = 35.69$, $p < 0.0001$, $\chi 2(1) = 14.24$, $p = 0.0002$, respectively).

[7] Since losses were possible in each round, we adjusted payoffs by adding 100 to each observation; this way, the properties of the Gini coefficient are maintained.

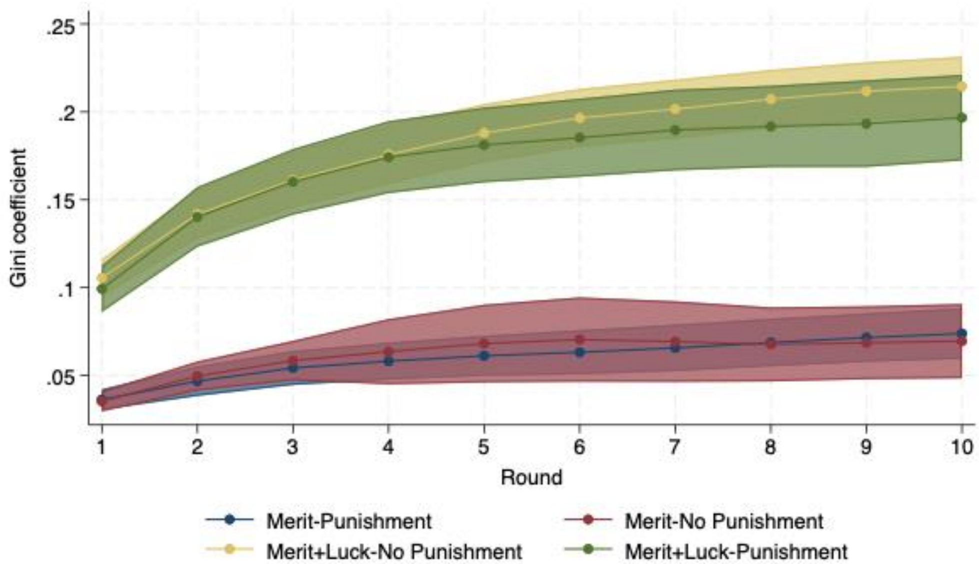

Figure 4: Gini coefficient over time by treatment, secret endowments. The shaded areas represent 95% confidence intervals

Study 2

In Study 1, endowments were revealed for some participants and not others, depending on the outcome of the BDM mechanism. This process led to an endogeneity problem: participants who choose not to reveal their endowments were likely to differ systematically from those who did reveal their endowments (Dal Bó et al., 2010). As a result, while Study 1 gave us valuable data on how much individuals value secrecy as a function of their circumstances and ability, it cannot help us understand what the consequences are to cooperation of keeping endowments secret. To answer that question, we conducted Study 2 using a different design.

Methodology

Our second experiment is once again a standard public good game, with a real effort task (single digit addition questions) determining participants' endowment in the public good game. Following their real-effort task, participants were told about their own endowment.

It was public information that the group was composed of two Advantaged and two Disadvantaged participants.[8] An Advantaged participant earned 3 tokens per correct answer; a Disadvantaged participant earned 1 token per correct answer. We informed the participants of their personal piece rate per correct answer before they started to work for their endowment.

In the first 10 rounds of the experiment, we did not inform participants of their group members' endowments, i.e., the endowment was private. We only told them the contribution levels of each group member and their own payoff. In the second 10 rounds of the experiment, we revealed the individual endowments of each person in the group.

We manipulated the possibility of costly peer punishment between-subjects. Figure 5 summarizes the timeline of the experiment.

[8] Like in study 1, we used neutral language throughout. See the Instructions in Appendix A.

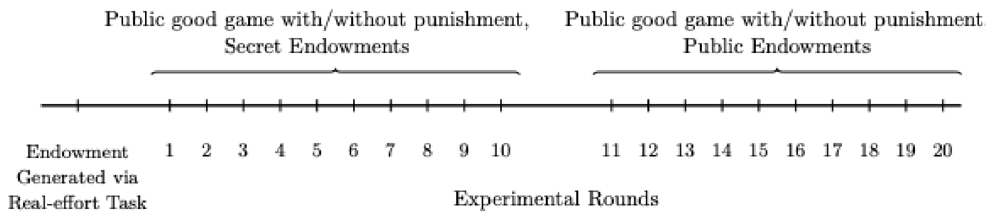

Figure 5: Timeline of Study 2.

Experimental procedure

We collected 25 groups of four in the Punishment and No Punishment treatments, $N = 200$. The experimental software matched participants in groups of four at the start of the experiment, which remained the same thereafter (a 'partners' matching scheme). Participants were undergraduate students at the University of Exeter, who responded to an invitation through the lab's ORSEE recruitment system (Greiner, 2015). The experiment took place online due to the Covid-19 restrictions between July and August, 2020. Participants signed up to a session and were provided with a link to the oTree-based experimental webpage (Chen et al., 2016). They were told to log in at a pre-specified time, and the session was run with real time interaction online. Upon completing the experiment, the software displayed their payment information. Each session lasted on average 30 minutes; average payment was £7.77.[9] Participants were paid through a bank transfer.

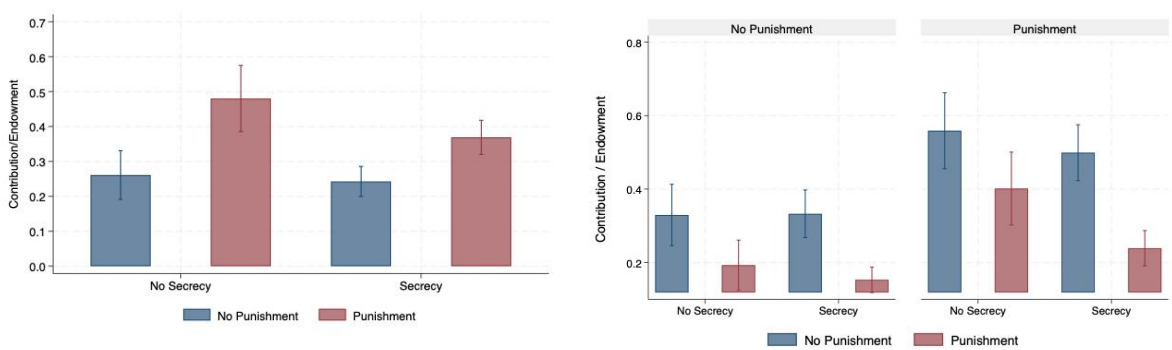

Figure 6: Relative contributions to the public good. Secrecy refers to behavior in rounds 1-10, while No Secrecy refers to behavior in rounds 11-20. Left: relative contributions by treatment. Right: Relative contributions by treatment and participant type. Error bars indicate 95% confidence intervals.

Results

Summary Statistics

Unless otherwise noted, all figures and tables in this section report results from random effects GLS regressions, using data at the individual-period level. Because there is inequality in endowments by design, our main unit of analysis will be relative contributions, which are contributions divided by the participant's endowment. In all cases we clustered standard errors at the group level. We collected a total of 50 groups, which satisfies the asymptotic requirements of the clustered standard error estimator (Cameron and Miller, 2015). We report *p*-values based on two-sided tests throughout. Table 4 reports the summary statistics for Study 2.

[9] The average payment was deflated by some participants who incurred in losses in the experiment due to punishment spending. Such losses were deducted from their £3 show-up fee.

Table 4: Summary Statistics - Study 2

	No Punishment		Punishment	
	Disadv	**Adv**	**Disadv**	**Adv**
# of correct puzzles	21.70	21.32	17.88	18.92
	(7.23)	(7.15)	(4.56)	(5.55)
Endowment	21.70	63.96	17.88	56.76
	(7.23)	(21.45)	(4.56)	(16.64)
PG contributions (absolute), Rounds 1-10	6.70	9.54	8.80	12.70
	(6.04)	(10.83)	(5.81)	(10.50)
PG contributions (absolute), Rounds 11-20	6.70	11.12	9.98	21.74
	(6.73)	(11.38)	(6.67)	(16.86)
Payoffs	28.62	67.25	23.28	52.62
	(10.04)	(22.28)	(13.42)	(19.39)
Female %	44%	42%	30%	30%
Age	20.96	21.00	21.02	21.00
	(2.00)	(2.70)	(1.95)	(2.43)
Groups, participants, N	25, 100, 2000		25, 100, 2000	

Standard deviations in parentheses are calculated based on individual-period as the unit of observation.

Public Good Contributions

We start by looking at the effect secrecy has on the effectiveness of peer punishment. The left panel of Figure 6 reports average relative contributions conditional on treatment. When endowments are public information, peer punishment leads to a significant increase in average relative contributions of 22 percentage points ($\chi 2(1) = 13.30$, $p < 0.001$). When endowments are secret, peer punishment leads to a significant increase in average relative contributions of 13 percentage points ($\chi 2(1) = 14.55$, $p < 0.001$). Punishment is more effective at boosting contributions under public endowments; indeed, the difference in differences is statistically significant ($\chi 2(1) = 4.42$, $p = 0.035$). We therefore find evidence to support Hypothesis 3.

We next break down the treatment effect by participant type, in the right panel of Figure 6. In the No Punishment treatment, the relative contribution by Advantaged and Disadvantaged participants is unchanged regardless of their endowment being disclosed or not (Disadvantaged: $\chi 2(1) = 0.01$, $p = 0.926$; Advantaged: $\chi 2(1) = 2.30$, $p = 0.130$). It is again under Punishment treatment that we record lower relative contributions to the public good under both types of participants when endowments are secret (Disadvantaged: -6pp, $\chi 2(1) = 3.17$, $p = 0.075$; Advantaged: -12pp, $\chi 2(1) = 16.49$, $p < 0.0001$).

In short, secrecy leads to lower cooperation when punishment is available. The effect is mainly driven by Advantaged participants. Secrecy has no impact on cooperation when punishment is not available.

We conclude by analyzing how the interaction between inequality and secrecy affects contributions to the public good. To do so, we conducted a random effects GLS regression of relative contributions to the public good on the group's Gini coefficient, a dummy for secret endowments (rounds 1-10), a dummy for punishment being available, all two-way interactions as well as the three-way interaction. Table 5 summarizes the results.

We find a negative a significant correlation between the degree of wealth inequality in a group and average contributions. The main effect of punishment on contributions is positive, albeit non-significant, while the main effect of secrecy on contributions is negative, although non-significant also. Surprisingly, the interaction between punishment and Gini, as well as Secrecy and Gini are positive, but non-significant – in fact the estimated standard errors are quite large, indicating very imprecisely estimated effects.

Table 5: Determinants of Relative Contribution

DV: Relative contribution	**Coefficient**	**Robust SE**
Punishment	0.115	(0.219)
Secrecy	-0.239	(0.164)
Punishment x Secrecy	-0.065	(0.208)
Gini	-1.695*	(0.737)
Punishment x Gini	0.562	(0.964)
Secrecy x Gini	0.904	(0.751)
Punishment x Secrecy x Gini	-0.034	(0.955)
Constant	0.604***	(0.169)
R-squared	0.14	
N (Observations, Groups)	4,000, 200	

A random effect GLS regression was used to obtain the results in the table. The dependent variable is the relative contributions to the public good. The independent variables include the group's Gini coefficient, a dummy for secret endowments (rounds 1-10), a dummy for punishment being available, all two-way interactions as well as the three-way interaction. ***: p<.001; **: *p*<.01; *: *p*<.05

In short, we find no evidence in support of Hypothesis 4. However, we must caveat our finding by acknowledging that we are relying on natural variation in inequality driven by ability, rather than comparing to groups in which all four players received the same piece rate.

Inequality

What is the consequence of these behavioral findings to wealth inequality? Figure 7 displays the evolution of the Gini coefficient for the punishment and no-punishment treatments. In the first ten rounds, individual endowments were secret. The average Gini coefficient increases over time in both treatments, initially more rapidly in the Punishment condition. By the 7th round, the difference in average Gini coefficients is significant ($\chi 2(1) = 4.20$, $p = 0.041$). The difference between treatments declines slightly, such that by round 10, it is only statistically significant at the 10% level ($\chi 2(1) = 2.91$, $p = 0.089$). Once endowment information is released at the start of the 11th round, we observe a clear divergence in the time trend of Gini coefficient between the two treatments: a negative trend in Punishment and a positive trend in No Punishment. By round 20, there is no statistically significant difference in average Gini coefficient across the two treatments ($\chi 2(1) = 0.13$, $p = 0.723$).

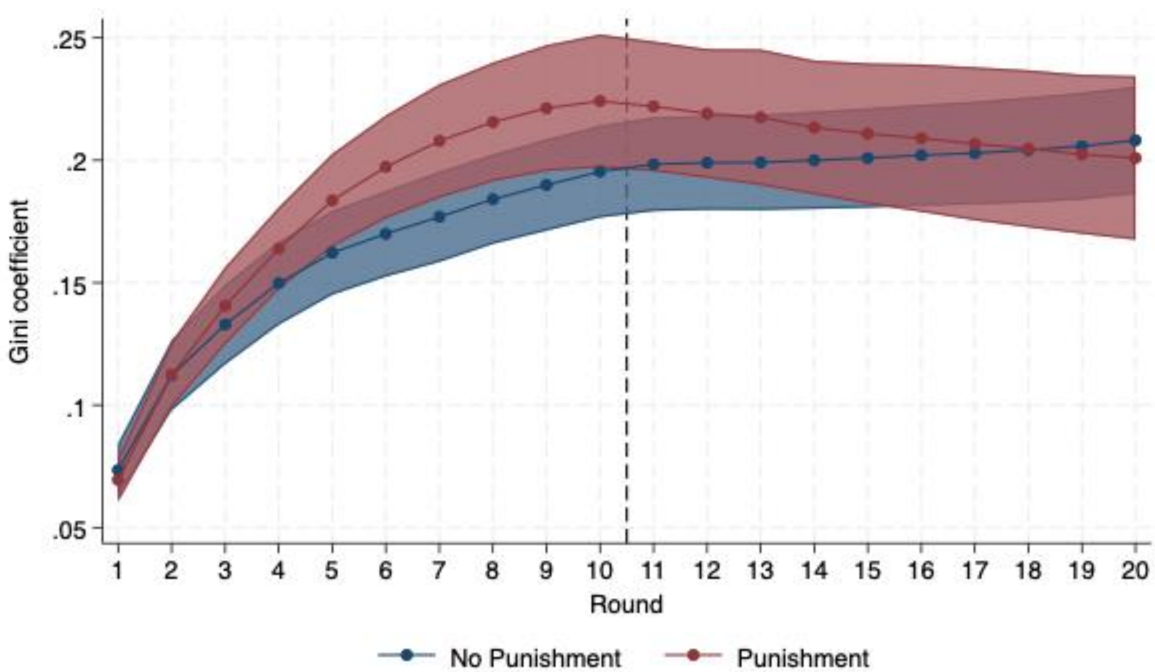

Figure 7: Group payoffs and inequality. Top Left: round payoffs by treatment. Top Right: round payoffs by treatment and participant type. Bottom: Gini coefficient by treatment over time. Shaded areas are 95% confidence intervals. Endowments were secret in rounds 1-10, and public information thereafter.

Discussion

Theoretical Implications

First, by exploring the impact of punishment on cooperation, this study makes a meaningful contribution to the corporate governance and accountability literature. Specifically, our findings reinforce the role of penalties in promoting compliance and ethical behavior within organizations (Scherer & Palazzo, 2011). The study aligns with and extends upon Carroll's (1991) Corporate Social Responsibility model by positioning public goods contributions as essential ethical obligations for improving social welfare.

This research reveals a clear market dynamic by illuminating how corporate social responsibility mirrors public good contributions. Organizations that contribute equitably to social welfare reap tangible rewards through enhanced reputation and deepened stakeholder trust (McWilliams & Siegel, 2001). Freeman's (1984) stakeholder theory warns that companies avoiding societal contributions face severe market consequences – customers redirect purchases, investors withdraw capital, and collaborators seek alternative partnerships. The market effectively punishes free riders while rewarding ethical corporate citizens.

This study finally advances business ethics research by demonstrating the value of experimental methods in investigating ethical decision-making, transparency, and cooperation. Experimental approaches allow for controlled testing of ethical behavior and compliance within simulated environments, contributing empirical depth to the theoretical discussions in CSR and business ethics (e.g., Brown & Treviño, 2006; Scherer & Palazzo, 2011). By using experiments to model real-world ethical dilemmas, this study provides practical findings into how transparency and punishment influence cooperation, thus advancing both theory and practical understanding in organizational ethics.

Practical Implications

The present research also provides actionable insights for business leaders and policymakers. Within organizations, it underscores the critical role of transparency in fostering cooperation and trust. Businesses are advised to implement transparent policies, especially in areas such as pay scales and performance evaluations, to help reduce inequalities and build trust across all levels, including top management and executives. For example, the European Commission introduced a directive in 2023 requiring pay transparency measures across EU countries, aiming to address disparities like the gender pay gap (Bennedsen et al., 2023). Automatic disclosure of pay information can significantly reduce such gaps by fostering fairness in compensation practices. However, transparency alone may not be sufficient. Our findings suggest that punishment mechanisms are also necessary to ensure equitable contribution, reinforcing accountability for those who may otherwise refrain from contributing. Such mechanisms could include measures like salary adjustments, formal warnings, or, in extreme cases, termination for non-contributors.

At an inter-company level, this study emphasizes the importance of transparent financial reporting and open communication with stakeholders regarding company profits and tax practices. As firms face growing scrutiny over tax avoidance and evasion, more transparent and ethical reporting practices are necessary. For example, regulatory measures that enforce accountability through penalties for non-compliance, similar to the Sarbanes-Oxley Act, could serve as a framework. In this way, companies can foster trust and uphold ethical standards by being transparent about their financial activities.

At the societal level, this research offers insights into wealth concealment, particularly among individuals who receive income from chance rather than merit, such as windfall gains or inheritances. Unequal wealth concentration raises serious ethical concerns, as it amplifies social tensions and challenges the moral responsibilities of both businesses and individuals (Piketty, 2014). Thus, particular attention should be paid to cases involving unearned wealth to promote social responsibility and mitigate inequality.

Future Directions and Implications

Although we offer a strong experimental design and robust results, our study has clear limitations. First, laboratory experiments reduce the complexity of real business dynamics, but our controlled tests may not fully capture the complexity of real world social and economic interactions. Although controlled experiments allow for isolation of variables like wealth inequality and punishment, they may limit the external validity of findings. Future research could incorporate field experiments or longitudinal studies within organizational or community settings to test whether these dynamics hold over longer periods and in more natural environments.

Second, our experiments primarily examine wealth inequality based on income generated by either luck or merit, which may not capture the full range of inequalities present in real-world settings, such as educational, social, or political inequalities. Including a broader spectrum of sources of inequality – such as educational disparities, political powers or access to resources (as in Bogliacino et al., 2023) – could provide a more comprehensive view of how different types of inequalities impact cooperation and redistribution preferences. Additionally, exploring interactions between various types of inequality could deepen our understanding of those complex power dynamics.

Third, our study contributes to the broader understanding of how transparency and punishment influence cooperation in the context of wealth inequality driven by luck and/or merit. In our experiment, those who are least deserving of their wealth – the "lucky" participants – appear to be the most motivated to conceal it. This contrasts with well-established literature on redistributive preferences. Prior studies (Alesina & Angeletos, 2005; Benabou & Tirole, 2006; Krawczyk, 2010; Cojocaru, 2014) have shown that when individuals view wealth as luck-based, they are generally more supportive of redistribution, while wealth perceived as effort-based tends to reduce this support. Participants in those cases expressed willingness to redistribute, but in our experiment still sought ways to avoid it. Further research is needed to explore this apparent disconnection between attitudes and actions regarding wealth redistribution.

Last, this work emphasizes formal punishment mechanisms, it does not fully explore informal punishments, such as social exclusion or peer disapproval, which are also prominent in real-world scenarios. As Guala (2012) and others suggest, societies often rely on coordinated, informal sanctions to encourage ethical behavior. Future research could compare the effectiveness of "soft" versus "hard" punishment methods to determine which approach fosters sustainable cooperation more effectively. For instance, researchers could examine whether fines and punishments that increase/decrease with the extent of evasion reduce the extent of free-riding (Gamannossi degl'Innocenti et al., 2023). Additionally, future studies could explore how different communication channels, such as face-to-face discussions or anonymized online platforms, influence the relationship between endowment information, contributions, and punishment.

Conclusion

Across two studies, the present research sheds light on the critical role of transparency and punishment in fostering cooperation and mitigating the effects of economic inequality on public good contributions. As global inequality continues to rise, particularly with the wealthiest few consolidating more resources, the negative impact on social cohesion and business environments becomes more pronounced. Financial secrecy exacerbates these disparities by enabling wealth concealment, both at the societal and organizational levels. Our experimental findings demonstrate that transparency can significantly enhance cooperation, particularly among advantaged individuals, when paired with peer punishment. However, without transparency, punishment alone proves insufficient in reducing inequality. These insights highlight the importance of designing ethical governance structures that promote fairness, transparency, and accountability – principles crucial for businesses aiming to operate in a more socially responsible and equitable manner.

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Appendix

Appendix A Instructions

Welcome to our experiment. Please read these instructions carefully. Your compensation for today will depend on your decisions and actions, as well as the decisions and actions of other participants in the room. It is therefore important that you understand how the study will take place.

Please do not talk to other people in the room. If you have a question, please raise your hand, and we will come to you.

There are 3 parts to this study. Each part has a separate set of instructions. You will receive a separate set of instructions for each part prior to its start.

Once you complete all the parts in the experiment, we will add up your earnings from **Part 2 and 3** and £3 show up fee, which will be your final payment for the whole experiment. The currency in the experiment is the Experimental Currency Unit (ECU). £1 = 100 ECU.

We will split up participants in this session into a number of groups. Each group will be made up of 4 people, and you will NOT know who among the participants in the session is in your group. Each group member will have an identification letter: A, B, C, or D.

You are randomly assigned as Player A/B/C/D/E. You will keep THE SAME player ID and stay with THE SAME 3 participants in a group for the duration of this experiment.

Part 1

In the first part of the experiment, you and every member of your group will solve as many questions as you can in 2 minutes. Questions are an addition operation with a subtraction. Here are some sample problems:

2 + 9 - 4 = ? 3 + 5 - 1
= ?
1 + 8 - 2 = ?
3 + 9 - 5 = ?

Once the part commences, the computer will display one question at a time on the screen. You will have a text box next to the question in which you must enter the answer. You must then click the OK button on the bottom right-hand corner of the screen (pressing Enter will not work).

[**Equality treatments**: Each member of the group will receive **1 ECU** for of the correct answer.]

[**Inequality treatments**: *Two players in your group will receive **1 ECU** for each correct answer, and the other two players will receive 3 ECU for each correct answer. You will receive **1/3 points** ECU per correct answer.*]

After the two minutes elapse, the computer will display on the screen how many ECU you have earned. From this point in the instructions, we will call the amount that you earn in Part 1 your 'Endowment'. It is important to note that we do NOT pay you for this part directly, however, your earnings from this part will determine your endowments in ALL the other parts of this experiment. You will have the opportunity to practice this task before the experiment starts.

Part 2

There are 2 rounds in this part. Each round has two stages. The first stage works as follows:

Stage 1

You will start each period with the amount of ECU you were able to earn in Part 1, which from now on we will call your 'endowment'. Your endowment is private information only you will know how large it is. Likewise, you will not know the endowments of the other three persons in your group.

You will decide how much of your endowment to contribute to a group account, and how much you want to keep for yourself. The amount you keep for yourself is equal to the difference between your endowment and your contribution to the group account.

The other three people in your group will make the same decision as you, although they may have different amounts of ECU to allocate.

Your income for each period consists of two parts:

1) The ECU you kept for yourself; and 2) Your income from the group account = 40 percent of the total contribution of all 4 group members (including your own contribution to the group account).

Your ECU income at the end of Stage 1 = (Your endowment - Your Contribution) + (0.4 x Total Group Contribution)

Since everyone in the group is paid 40 percent of the total amount contributed to the group account, all group members will receive the same income from the group account.

Let's now consider a few numerical examples.

Suppose that your endowment is 30 ECU. You contribute 10 ECU to the group. The total contribution to the group account is 60 ECU. Then each group member gets 0.4 x 60=24 ECU from the group account. Your income at the end of Stage 1 in this period is 30 - 10 + 24 = 44 ECU.

Suppose instead the total contribution to the group account is 15 ECU. Each group member gets 0.4 x 15 = 6 ECU from the group account. As the previous example, your endowment is 30 ECU and you contribute 10 ECU to the group account. Your income at the end of Stage 1 in this period is 30 - 10 + 6 =26 ECU.

To sum up: Each ECU you contribute (which costs you 1 ECU) to the project raises the total contribution to the project by 1 ECU and causes your income from the project to rise by 0.4 x 1=0.4 ECU. The income of the other three participants will also rise by 0.4 ECU. Your contribution to the group account therefore also raises the income of the other participants.

Conversely, contributions to the group account by other participants also raise your income; for each ECU contributed by another participant, you earn 0.4 x 1=0.4 ECU.

Once you decide on the amount to contribute to the group account, the first stage is over and the second stage starts.

Stage 2

Once all the group members make their decision, the computer will calculate the earnings for each group member. The computer will then provide feedback to you about:

- The amount each group member contributed to the group account (including you) • The total amount contributed by all four group members (including your contribution)
- Your income at the end of Stage 1. [**Punishment Treatments**: *After you receive feedback from the computer, you can decide whether or not you wish to reduce the income of the other three participants. The other three participants can also reduce your income if they wish to.*

*You can reduce the income of a given participant by assigning points to that participant. Each point you assign reduces that person's income by **3 ECU**. Note that once that person's income is reduced to 0, no further* *reduction will take place. You can distribute as many points to a given participant as you can afford (which equals to your income at the end of Stage 1). In particular, each point you assign costs you 1 ECU.*

Your income for this period is calculated in two steps. First, we start with your Stage 1 income and subtract the total points that you receive from your group members. That gives us the Reduced Income = Your current income from Stage 1 - 3 x total points received from others. Note that the Reduced Income cannot go below 0. Second, we subtract the total number of points you assigned to others from your Reduced Income, then we have Your Final Income for This Period = Reduced Income - Points you assigned to others.

For example, if you assign 0 points to a participant, it does not change that participant's payoff. If you do not receive any points from your group members, your final income remains unchanged.

If you assign 5 points reduces that participant's payoff by 15 ECU. Your own payoff goes down by 5 ECU. Suppose that your Stage 1 income is 20 ECU and you receive 10 points in total from your group members, your Reduced Income is 0. Your Reduced Income = Stage 1 income - 3 x total points from others = 20 - 3 x 10 = - 10 ECU. Since Reduced Income cannot go below 0, your Reduced Income is set to 0 ECU. Your final income for this period =

Reduced Income - points you assign to others = 0 - 5 = - 5 ECU.]

Important note: Whatever ECU you earn at the end of a period does not carry over to the following period. You will start each period with the amount of ECU you earned in Part 1. It is possible for you to get negative income for specific periods. Your total earnings for this part equal to the sum of earnings for all 10 periods.

To make sure that you fully understand the game, we would like you to answer a few quiz questions, based on hypothetical examples.

[Study 1: Part 3]

*Before we start, we would like you to make one additional decision. You will only make this decision **once** in this part, at the very start; the decision you make will affect all 10 periods in this part.*

In addition to the amount each group member contributes to the group account, your group members and you will also be able to know how many ECUs each group member has at the start of each period in this part. You can, however, hide your endowment information from your group members if you wish. Your group members can also hide their endowment information from you if they wish.

*Hiding the endowment information is costly, but the price is uncertain. You will be asked about the highest amount (in ECUs) you are willing to pay to hide your endowment information before knowing the actual price. Your stated highest amount you are willing to pay must be between 0 and your endowment. That stated amount also must be a **whole number**.*

After you submit this amount, the actual price will be randomly determined by the computer; it will also be a number between 0 and your endowment and revealed on the screen.

*If your stated willingness to pay is **higher than or equal** to the actual price, then you will be able to **hide** your ECU endowment from the other group members for all 10 periods in this part. Meanwhile, your endowment will be reduced by the **actual price** in every period. If your stated willingness to pay is **lower** than the actual price drawn by the computer, then your ECU endowment will be **revealed** to the other group members for all 10 periods in this part. And your endowment will **stay the same** (as determined in Part 1).*

Note that the computer draws the actual price randomly between 0 and your endowment amount. Also, all prices in that range are equally likely to be drawn. The higher your stated willingness to pay is, the more likely your endowment information will be hidden. Likewise, the lower your stated willingness to pay is, the less likely your endowment information will be hidden.

Depending on your other group members' decisions and their computer draws, you may or may not see their endowment information for all 10 periods in this part.]

Appendix B Additional Statistics and Figures

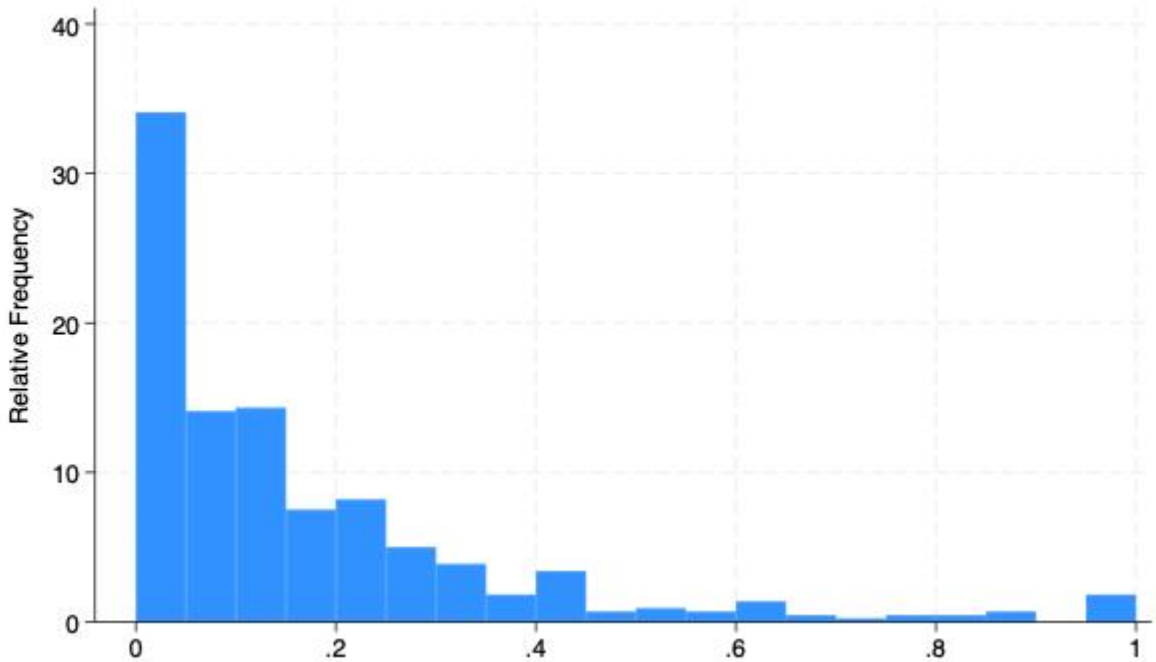

Figure B1: Distribution of willingness-to-pay for secrecy

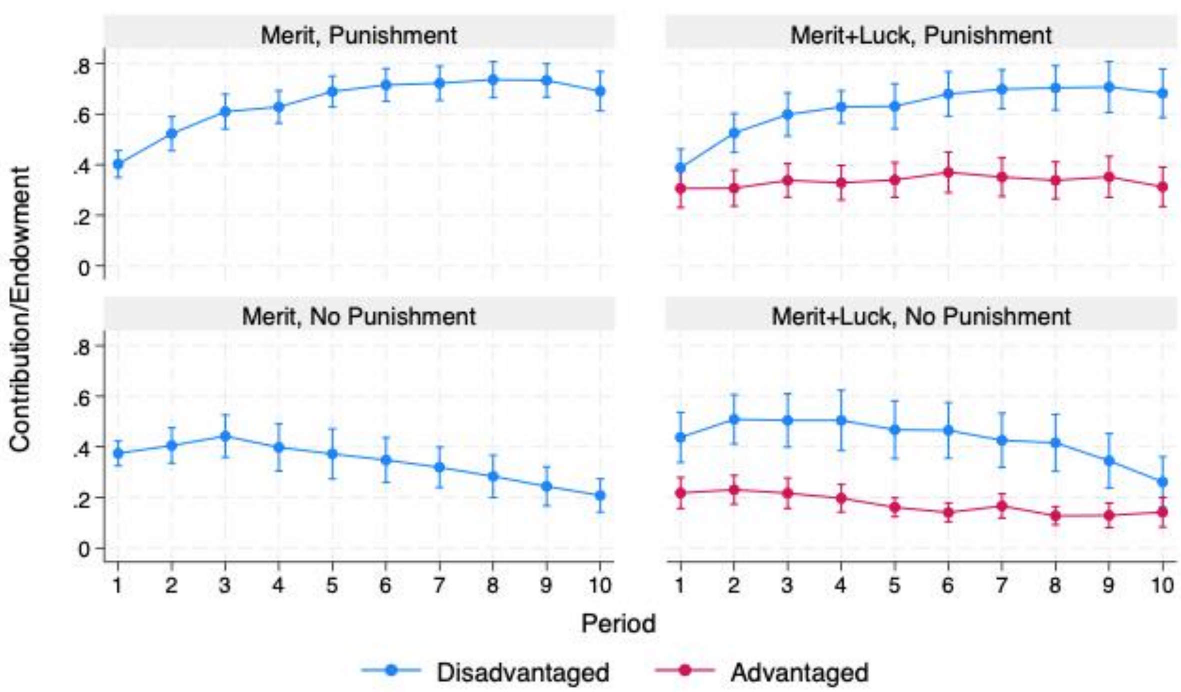

Figure B2: Contributions per period and treatments for Advantaged and Disadvantaged

Table B1: Variables included in the experiment

Variable	**Name**	**Mean**	**SD**	**Median**	**Min**	**Max**
From 1 (*Income should be made more equal to 10*) to 10 (*We need larger income differences as incentives for individual effort*)	Equality	5.26	2.53	5	1	10
From 1 (*In the long run, hard work usually brings a better life*) to 10 (*Hard work doesn't generally bring success - it's more a matter of connections*)	Hard work	4.58	2.55	4	1	10
From 1 (*Wealth can grow so that there's enough for everyone*) to 10 (*People can only get rich at the expense of others*)	Zero Sum	5.67	2.38	6	1	10
From 1 (*Private ownership of business and industry should be increased*) to 10 (*Government ownership of business and industry should be increased*)	Private	4.80	2.09	5	1	10
From 1 (*Government should take more responsibility to ensure that everyone is provided for*) to 10 (*People should take more responsibility to provide for themselves*)	Gov	4.37	2.33	4	1	10
From 1 (*The amount of income someone earns is private and should remain private*) to 10 (*The amount of income someone earns is public information that anyone have access to*)	Private Info	4.47	2.51	4	1	10
From 1 (*The amount of income a CEO earns at a publicly traded firm should be public information*) to 10 (*The amount of income a CEO earns at a publicly traded firm should be private*)	CEO Pay	6.4	2.79	7	1	10
In political matters, people often talk of "the left" and "the right". How would you place your views on this scale, generally speaking? From 0 (*Left*) to 10 (*Right*)	Left-Right	4.43	2.11	5	0	10
Are you generally a person who is completely willing to take risks, or do you normally try to avoid taking them? Indicate your feelings about this issue below, in which 0 means completely unwilling to take risks,	Risk	5.58	2.30	6	0	10

and 10 means completely willing to take risks						
Your endowment in the experiment was determined by the number of questions you could answer in Stage 1. State how fair you think this was from O (completely unfair) to 10 (completely fair).	Stage 1 Merit fair	5.93	2.99	6	0	10
In Part I of this study, two of your group members received 3 ECU per correct answer, while the others received 1 ECU per correct answer. State how fair you think this was: From 0 (*Completely Unfair*) to 10 (*Completely Fair*)	Multiplier fair [Inequality]	5.82	2.98	6.5	0	10
In Part I of this study, everyone received 1 ECU per correct answer. State how fair you think this was: From 0 (*Completely Unfair*) to 10 (*Completely Fair*)	Multiplier fair [Equality]	6.05	2.99	6	0	10
How severe do you think the inequality in endowments was in your group? Please respond from 0 (no inequality) to 10 (extremely severe inequality).	Endowment fair	6.02	2.39	7	0	10
Compared to the other participants in this experiment, do you think your earnings are below average (1), average (2) or above average (3))?	Self-earning	1.94	.72	2	1	3
Compared to the other participants in this experiment, do you think your performance on the calculation task was below average (1), average (2) or above average (3)?	Self-perform	2.13	.68	2	1	3
Based on your experience in the experiment, how would you characterize the distribution of incomes: Unfair (1), Somewhat unfair (2), Somewhat fair (3) Fair (4)	Fairness	2.41	.85	2	1	4