Journal of Public Economics 238 (2024) 105172

Contents lists available at ScienceDirect

Journal of Public Economics

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

Coordinated selection of collective action: Wealthy-interest bias and inequality

Luca Corazzini [a,b], Christopher S. Cotton [c,*], Enrico Longo [d], Tommaso Reggiani [e,b,f]

[a] University of Milan-Bicocca, Italy
[b] Masaryk University, Czech Republic
[c] Queen's University, Canada
[d] University of Hamburg, Germany
[e] Cardiff University, United Kingdom
[f] IZA, Germany

ARTICLE INFO

JEL classification:
C91
C92
H40
H41
L31

Keywords:
Multiple public goods
Donor heterogeneity
Crowdfunding
Lab experiment

ABSTRACT

We extend a collective action problem to study policy and project selection by heterogeneous groups who prefer to work together on a joint initiative but may disagree on which initiative is best. Our framework, adapted from a model of multiple threshold public goods, presents groups with several mutually exclusive projects, any of which require sufficient support from the group to succeed. Individuals strictly prefer to contribute where and how much they believe others expect of them to ensure joint project success. Groups tend to coordinate on the public good preferred by the wealthiest member, demonstrating a wealthy-interest bias even without corruption, politics, and information asymmetries. At the same time, groups divide costs in highly progressive ways, with the wealthy voluntarily funding a disproportionate share, helping offset the inherent inequality from endowment and selection differences. We discuss applications for policy selection, charitable giving, and taxes.

1. Introduction

The wealthy have a disproportionate influence over policy.[1] They can shape policy through campaign contributions (e.g., Francia et al., 2003), spending on lobbying (e.g., Baumgartner et al., 2009), and advertising or public relations campaigns to shape public opinion (e.g., Page et al., 2019).[2] Various policies and institutional reforms, from restrictions on campaign contributions to improved oversight, may reduce the ability of the rich to use their wealth to exert influence, rent-seek, engage in government capture, or distort public opinion (e.g., Cotton, 2009, 2012; Prat, 2002; Coate, 2004; Hummel et al., 2021; Gulzar et al., 2021).

Our paper strips away the political mechanisms and institutions through which the rich actively shape policy. There are no information asymmetries, communication, or political processes to manipulate. We show that, even without such factors, heterogeneous groups gravitate towards the policies, programs, or projects preferred by the wealthy. They do so not because such policies are more preferred, efficient, or effective than other options but because of an expectation that others will also focus on the same policies. The interests of the rich serve as a focal point that improves cooperation and coordination among groups.

To explore these issues, we extend a collective action framework to include multiple, mutually exclusive collective actions, and to study the coordinated selection between these alternative policies. Specifically, we adapt a threshold public goods framework to include multiple public goods and heterogeneous endowments and preferences. Each public good in the Multiple Threshold Public Goods (MTPG) framework

* Corresponding author.
E-mail address: cc159@queensu.ca (C.S. Cotton).

[1] Echoing George Orwell, Paul Krugman conveyed the popular view that "America's wealthy exert huge political influence. Our ideals say that all men are created equal, but in practice, a small minority is far more equal than the rest of us" (Krugman, 2020-07-01).

[2] The literature on each of these topics is extensive. See Bauer et al. (2007), Lessig (2011), and Goss (2016) for overviews of how the wealthy influence policy, Stratmann (2005) for a partial review of the literature on money in politics, Gimpel et al. (2008) for consideration of how wealthy donors influence elections outside of their locations, and Grossman and Helpman (1994), Hall and Deardorff (2006) and Cotton (2012) for alternative models of influence through lobbying.

https://doi.org/10.1016/j.jpubeco.2024.105172
Received 27 April 2023; Received in revised form 1 July 2024; Accepted 1 July 2024
Available online 20 July 2024

is associated with many equilibria that differ not in total payoffs but in the distribution of payoffs. The framework is a coordination game, where collective success requires that groups not only contribute enough effort or resources in total but also contribute towards the *same* alternative. Individuals may disagree about what good or distribution of costs is best, but they prefer to contribute towards and successfully implement any of the public goods than to fail to collaborate. Within such a strategic environment, individuals want to contribute how much others expect them to contribute and to the same good as others. The selected public good and division of costs reflect collective expectations of group behavior. In this way, the analysis gives insight into collective expectations about what policy may look like, regarding who benefits most and how costs are divided.

First, we find that heterogeneous groups tend to concentrate on and implement the public good preferred by the highest-income member. In the MTPG environment, policy selection favors the rich not because of biased or corrupt bureaucratic or political institutions and mechanisms, or because of an efficiency advantage from those options–factors absent from our framework. Rather, the pro-wealthy bias emerges because group members gravitate towards the goods preferred by the wealthy because they believe such goods are likely to receive support from others. When individuals expect others to focus on the good preferred by the rich, they, too, want to focus on the same good.

Second, groups adopt highly progressive contribution profiles, with wealthier members contributing disproportionately more than others. The differences in contributions across individuals largely offset differences in endowments and benefits received from the implemented good. Individuals are better off contributing in the way others expect them to, even when they do not believe the division of costs is optimal or fair. Groups adopt progressive contribution patterns not because everyone favors such a division of costs over alternative options but because such a division stands out as the salient option.

Our results have several implications for understanding wealthy-interest biases in policy selection. They suggest that an observed bias in policy selection is not necessarily an indicator of corruption or government capture. Instead, the policy bias favoring the rich may emerge naturally in groups attempting to work together as individuals look to the preferences of the wealthy as an indicator of which policies or public goods to collectively pursue. The result additionally suggests that eliminating the bias in favor of the wealthiest interests requires more than just eliminating channels of corruption and capture but also requires efforts or mechanisms that improve the salience of other options. However, although the policy selection tends to favor the wealthy, the division of costs does not. Groups that successfully implement a public good tend to divide costs in ways where voluntary contributions increase in income and the benefits received, largely offsetting the wealthy members' wealth and policy advantage.

The model and results also give insight into a variety of other applications. In the penultimate section, we discuss our work in the context of charitable giving and tax structures, providing alternative explanations of rich-interest biases and progressive cost-sharing in these areas. In philanthropy, the charities or initiatives that the wealthiest donors prefer may be more salient and draw the contributions of others even without the presence of seed money, matching funds, or other mechanisms through which wealthy donors actively draw attention to their preferred options. Through the lens of macroeconomic policy, our results suggest that groups are drawn to policies and public goods that favor the wealthy and to tax structures in which the wealthy cover a disproportionate share of the costs. We highlight implications for the relevant veins of literature in these areas, and the potential for MTPG experiments to give further insight into such topics.

Section 2 presents a literature review and theoretical framework. Section 3 develops testable hypotheses that guide the experimental design in Section 4 and analysis in Section 5. Section 6 discusses applications to charitable giving and macroeconomic policy. Section 7 concludes.

2. Literature review and theoretical framework

2.1. Relationship to the literature

Granovetter (1978) considers collective action problems where the success of a joint project action requires that enough group members participate, i.e., that participation exceeds a minimum *threshold*. Modern threshold frameworks may involve individual decisions that are either discrete (e.g., individuals decide whether or not to support a joint project where the number of supporters must exceed a threshold) or continuous (e.g., individuals decide how much funding to direct to the joint initiative where total contributions must exceed a threshold), and a robust literature has developed experimentally studying *threshold public goods* (e.g., Andreoni, 1998; Bagnoli and McKee, 1991; Marks and Croson, 1999). Such threshold models represent special cases of the more general collective action framework developed out of Mancur Olson (1965). Sandler (1992) discusses the early literature and its interpretations; Heckathorn (1996) provides a summary of different collective action frameworks and dilemmas. For example, in Oliver et al. (1985), a threshold framework would be considered a collective action problem with a discontinuous and accelerating production function. See also Marwell and Oliver (1979), Marwell et al. (1988), and Sandler (1992) for consideration of how 'critical mass' facilitates successful collective action.

Our analysis is related to work within this literature that considers how group heterogeneity in the ability to pay (e.g., income) or preferences (e.g., benefits) affect individual contributions and collective success. Oliver et al. (1985) argues that both preference and resource heterogeneity may be important determinants of individual contributions when public good production functions are accelerating, which is the case with threshold public goods. Marwell and Oliver (1979), Marwell et al. (1988), and Sandler (1998) further establish that the relative importance of ability to pay and preferences in determining the success of public goods and how costs are divided may be highly context-specific. In such settings, heterogeneity can theoretically improve the success of the joint project when it reduces the number of individuals expected to contribute to ensuring public success by enabling either the richest members or those receiving the greatest benefits to fund a good on their own without the need for broader coordination (e.g., Oliver et al., 1985; Marwell et al., 1988).[3] Additionally, substantial work has considered global collective action problems and how a government's propensity to contribute to an international effort depends on both its ability to pay (e.g., the size of its economy) and the benefits received from successful collective action. For example, Sandler and Forbes (1980), Murdoch and Sandler (1984), and Hartley and Sandler (1999) show how NATO members shifted from dividing costs based primarily on economic size (ability to pay) in the 1960s to sharing costs based on perceived benefits received from NATO in more recent years. Such questions are related to our analysis of how, in our experiment, differences in ability to pay (e.g., endowed income) and benefits received (e.g., individual benefit associated with successful collective action) affect contributions. Within our framework, both factors drive individuals to contribute more when they have larger endowments and expect higher benefits from public good success. In the MTPG framework, voluntary contribution differences largely offset agents' advantages due to endowment differences or the benefits of the implemented good.

The closest work within the experimental literature uses lab experiments to study contributions to threshold public goods (Andreoni, 1998), considering either how the design of the threshold mechanism or the role of individual heterogeneity affects contributions and public good success. Bagnoli and McKee (1991) show how groups are

[3] See also Hirshleifer (1983) and Ray et al. (2007) who present collective action games where endowment inequality can increase the success of a joint project when individual contributions are perfect substitutes.

generally successful in reaching the threshold, though total payoffs can be lower in the presence of heterogeneity, particularly preference heterogeneity. Marks and Croson (1999) study the impact of incomplete information about the distribution of preferences among group members, with results suggesting that incomplete information can facilitate rather than hinder cooperation in reaching the threshold. Both Rapoport and Suleiman (1993) and Brekke et al. (2017) find that in cases with endowment differences, individuals tend to contribute similar shares of their wealth and that homogeneous groups are more likely to succeed in funding a public good than heterogeneous groups.[4]

A consistent feature throughout the collective action and threshold public good literature is their focus on a *single* initiative (e.g., project, opportunity, action). Individuals only decide whether or how much to contribute to a given action, and there is no group decision to select an action from a set of alternatives. In the few cases where multiple joint projects simultaneously vie for funding, the projects are not mutually exclusive, and groups may implement multiple projects simultaneously. In contrast, in the MTPG framework developed by Corazzini et al. (2015), groups face multiple projects and can fund at most one. Such a framework better matches situations where actions are by nature mutually exclusive: once a group solves a problem, other solutions are unnecessary; once a partisan candidate secures the nomination, support to alternative candidates is wasted; once one waterfront re-development project is built, the alternative uses of the site are irrelevant.

The MTPG framework has recently been used to model donor selection of crowdfunded and philanthropic projects (e.g., Corazzini et al., 2015, 2019) in settings where individuals are homogeneous. Corazzini et al. (2015) studies show how the multiplicity of contribution options confounds the coordination problem, reducing the probability of successful collection action compared to environments with a single action and no choice over alternatives. The literature also considers how focal points (e.g., Corazzini et al., 2015), intermediaries (e.g., Corazzini et al., 2019), refund rules (e.g., Cason and Zubrickas, 2019; Cason et al., 2021), and other factors can facilitate collective action in complex environments.

Our analysis incorporates income and preference differences into the MTPG framework. While Cason and Zubrickas (2019) allows for preference heterogeneity, none of the papers in this area incorporates endowment or income inequality. Incorporating both endowment and preference heterogeneity is required to consider whether groups are more likely to focus on the options the wealthy prefer. This allows us to focus on selection, introducing into the collective action framework a collective decision typically included in social choice and political economy models, not collective action problems. The MTPG framework is not only one of collective action but also one of collective policy selection.

Additionally, our paper is closely linked to literature involving influence and lobbying, policy selection, and philanthropy, which we discuss in later sections on specific applications of our framework.

2.2. MTPG with heterogeneity

We extend the multiple threshold public good framework (e.g., Corazzini et al., 2015) to incorporate donor heterogeneity in endowed income and preferences over alternative actions.

We formally describe a one-period MTPG contribution game that allows for heterogeneity. There is a group of J individuals, each of whom simultaneously chooses whether and how much of their endowment, y_j, to contribute to each of N public goods. Individual j's contribution to good n is denoted $c_{j,n}$. Total contributions by all group members to good n are $C_n \equiv \sum_j c_{j,n}$, and total contributions made by individual j across all N goods are $C_j \equiv \sum_n c_{j,n}$. Feasibility requires $c_{j,n} \geq 0$ and $C_j \in [0, y_j]$ for each j and n.

Function $B_{j,n}(C_n)$ determines the benefit agent j receives from public good n. The benefit depends on whether the aggregate contribution to the good reaches a threshold, τ, the minimum contribution necessary for that public good to succeed. If agents fail to reach the threshold level, then the public good does not return any benefit. Conditional on the threshold being reached, the public good benefits each player independent of their individual contribution. Successful goods take on a "linear public good plus bonus" structure above the threshold, with preference heterogeneity captured by differences in the bonus parameter. Specifically, for each good n,

$$B_{j,n}(C_n) = \begin{cases} 0 & \text{when } C_n < \tau_n \\ C_n + b_{j,n} & \text{when } C_n \geq \tau_n. \end{cases} \tag{1}$$

We assume that $\tau_n \leq \sum_j y_j < \tau_n + \tau_m$ for all n and m, ensuring that groups can afford to fund one public good at its threshold but cannot successfully implement multiple goods.

Any endowment not contributed to a public good gets directed to private consumption, which returns a marginal benefit $V > 1$. Therefore, player j earns total payoff:

$$u_j(c_{j,1}, \dots, c_{j,N}) = V(y_j - C_j) + \sum_{n=1}^{N} B_{j,n}(C_n). \tag{2}$$

Within this framework, there is no equilibrium in which $C_n > \tau_n$, as each individual contributing to the good has the incentive to reduce their contribution as much as they can without causing total contributions to fall below the threshold (ensured by $V > 1$). There are also no equilibria in which contributions are made to a good that fails to achieve its threshold, as anyone making such a contribution would be better off redirecting it to their private account or ensuring another good reaches its threshold.

We impose the additional assumption that $y_j \leq B_{j,n}(\tau_n)/V$ for all j, n. This ensures that individuals are willing to contribute up to their entire endowments if doing so is required for the success of a public good. This assumption is not necessary for the analysis. Rather, it simplifies the description of equilibria and matches the experimental environment.

Proposition 1. [5] *For any parameter values, there exists two types of equilibria: (1) a "no contribution" equilibrium in which $c_{j,n} = 0$ for all j, n, and (2) many "threshold provision" equilibria corresponding to every contribution profile in which for one good n, $C_n = \tau_n$ and $c_{j,n} \in [0, y_j]$ for each j, and where for all other goods $n' \neq n$, $C_{n'} = 0$.*

The result regarding the many threshold provision equilibria implies that an individual is willing to contribute up to their entire endowment to ensure a threshold is reached. If j anticipates that the other agents are contributing such that j is needed to achieve the threshold, then j prefers to provide the required contribution such that $C_n = \tau_n$. This is formalized in the following Corollary.

Corollary 1. *Let $C_{-j,n} = \sum_{i \neq j} c_{i,n}$. If $C_{-j,n} \in [\tau_n - y_j, \tau_n)$, then agent j prefers contributing $c_{j,n} = \tau_n - C_{-j,n}$, ensuring that $C_n = \tau_n$, rather than any other $c_{j,n} \in [0, y_j]$.*

Our MTPG framework has several notable features. First, any combination of individual contributions such that total contributions equal the threshold is an equilibrium. If one group member marginally decreases (increases) their contribution to the targeted public good, then the optimal response of any other group member would be to

[4] There is also an extensive literature considering donor heterogeneity in more-commonly studied continuous public goods environments (e.g., Chan et al., 1999; Cherry et al., 2005; Uler, 2011; Maurice et al., 2013; Duquette and Hargaden, 2021; Sheremeta and Uler, 2021).

[5] See Corazzini et al. (2015) for details on the equilibrium in related MTPG games.

marginally increase (decrease) their contributions to the good such that total contributions remain equal to the threshold. In other words, in each threshold provision equilibrium, *the marginal contributions of the individuals are perfect strategic substitutes*. Second, *at the extensive margin, contributions can be strategic complements*. A player prefers to "do his part" to support a public good only when he expects others to do their parts to support the same good. No one has an incentive to unilaterally support a collective action. Together, the first and second features present a multi-dimensional coordination game, where group success requires coordination on whether to contribute, to which public good to contribute, and how much to contribute.

The MTPG framework recasts the collective action problem as primarily a coordination game with many feasible equilibria. The primary concern is not whether individuals want to contribute but whether they will successfully coordinate their contributions (where and how much). The analysis focuses on selection, including which action/project/initiative the group members focus on and how they divide the collective costs of the action.

If the game is repeated, as is the case in our experimental setting, then there is even a broader set of subgame perfect equilibria in earlier rounds of the repeated interaction, including situations where total group contributions to a public good may fall below or above a threshold.[6] It remains that any feasible contribution profile that successfully implements one public good is consistent with equilibria. The strategic environment remains one of equilibrium selection and coordination.

3. Testable hypotheses

With the multiplicity of equilibria in MTPG frameworks, the game theoretic equilibrium concepts are agnostic about the relative likelihood of different equilibria. This is a common issue for coordination games and other strategic environments with multiple equilibria. Which outcomes emerge is primarily an empirical question.[7]

To make predictions around such outcomes, we rely on concepts of payoff dominance and focal points, identifying factors in our strategic environments that may drive attention to some equilibria or away from others,[8] as well as past empirical and experimental results documenting coordinated behavior and collective action.

First, we ask which public goods will most likely be successfully funded by heterogeneous groups. The selection of a public good is typically not considered in collective action problems, which assume either a single good vying for contributions or multiple goods where implementing one does not preclude implementing others.

In heterogeneous groups, the wealth and preferences of members may affect the salience of different public goods. For example, the preferences of the highest-endowment group member may provide a focal point, making the option preferred by the richest group member more salient than other goods. The first factor is consistent with an implicit pro-rich bias in society that has been documented in the psychology literature (e.g., Fiske, 2010; Mattan and Cloutier, 2020). Groups may expect the outcome preferred by the rich, even in situations (like our experiment) with no mechanisms or efficiency advantages driving such outcomes. Similarly, contributors may suspect that eventually reaching a threshold will be easier on the good favored by the donor with the deepest pockets. Given such perceptions, we expect groups to focus on and successfully fund the rich-preferred good more often than other goods.

Hypothesis 1. With heterogeneous endowments and preferences, groups tend to coordinate on and are more likely to successfully fund the public good preferred by the agent with the highest endowment.

Second, we consider how heterogeneous groups divide the cost of public good provision in an MTPG environment. A substantial literature considers contributions and joint success in collective action and public goods problems. We consider how contributions to a successful public good may reflect differences in agents' ability to pay (e.g., endowment size) and willingness to pay (e.g., benefits received from the public good). The empirical analysis allows for the possibility that either or both factors affect contributions. We consider whether the resulting contribution profiles partially or wholly offset the heterogeneity between donors.

Our framework is one of equilibrium selection, where the observed outcomes reflect expectations about the most likely outcomes. Groups may expect progressive contribution profiles in which those with higher endowments contribute more than those with lower endowments, in which case we expect contributions to increase in income. Alternatively, groups may expect higher contributions from members who receive higher benefits from a funded public good, in which case we expect contributions to increase in benefits received. Oliver et al. (1985) presents a theoretical framework in which both factors may be relevant when public good production functions are accelerating, which is the case with threshold public goods. However, the relative importance of each factor in our setting remains primarily an empirical question, which we capture in the following hypotheses.

Hypothesis 2. Ability-to-pay focused contributions — Agents with higher endowments tend to contribute more than agents with lower endowments to successful public goods. Empirically, C_j increases in y_j after controlling for preference differences, as captured by $b_{j,n}$.

Hypothesis 3. Benefits-focused contributions — An agent that receives a higher bonus from a successful public good tends to contribute more to that good than other agents. Empirically, when groups fund good n, $c_{j,n}$ increases in bonus parameter $b_{j,n}$ after controlling for differences in y_j.

In testing these hypotheses, we consider whether the relationships hold, how strong they are, and whether the contribution patterns partially or wholly offset differences in endowed incomes or benefits received from the public good.

Our final hypothesis concerns how heterogeneity affects the likelihood of public good success. Most literature considering such questions has focused on an environment with a single public good. In such settings, heterogeneity can theoretically improve the success of the joint project when it reduces the number of individuals expected to contribute by enabling the most affluent members or biggest beneficiaries to fund a good on their own without the need for broader coordination (e.g., Oliver et al., 1985; Marwell et al., 1988).[9] However, introducing heterogeneity in a setting with one threshold public

[6] Trigger strategies, where deviation in earlier periods triggers no cooperation in future rounds, can incentivize earlier round contributions inconsistent with the equilibrium of a one-shot game.

[7] We added Hypothesis 3 after preregistration to facilitate readability. Similarly, we edited the wording and format of the preregistered hypotheses for expositional reasons while keeping their content unchanged.

[8] Starting from Schelling (1960), many papers have documented how focal points can facilitate coordination in strategic settings with at least partially aligned preferences. Corazzini et al. (2015) provides a discussion of focal points specific to MTPG games and reports experimental findings that are generally consistent with the theory of Harsanyi and Selten (1988) who posits that groups will focus on either payoff dominant outcomes or risk dominant outcomes (corresponds to making no contributions in our experiment). Devetag and Ortmann (2007) summarize the broader literature and when coordination is more likely on efficient versus risk dominant outcomes. Mehta et al. (1994), Bardsley et al. (2010), and Crawford et al. (2008), among others, show how the decision context and asymmetries across payoffs can affect the emergence of focal points and the processes and attitudes within groups in coordination games.

[9] Hirshleifer (1983) and Ray et al. (2007) also present collective action games where endowment inequality can increase the success of a joint project when individual contributions are perfect substitutes.

good also complicates equilibrium selection, potentially reducing the perceived fairness and salience of the equilibrium in which all group members contribute an equal share to the threshold. Rapoport and Suleiman (1993) show that donor heterogeneity reduces coordination and successful provision of a threshold public good in lab experiments.

In our MTPG environment, heterogeneity has an additional role in hindering or enabling the coordinated selection of one good from the alternatives. Our final hypothesis makes two predictions. First, we expect that preference heterogeneity alone instills disagreement within a group, complicates the public good selection and coordination problems, and ultimately decreases the probability of successfully funding any public good. Second, we expect that introducing endowment heterogeneity into an environment with preference heterogeneity can improve coordination. This second insight follows from Hypothesis 1 and the expectation that the preferences of the wealthiest member may serve as a focal point to increase coordination and public good success. Individuals may disagree about which public good is best in an environment with preference heterogeneity alone. In an environment with both preference and endowment heterogeneity, individuals may disagree about which good is best but agree about which is most likely to be implemented.

Hypothesis 4. (1) Introducing preference heterogeneity into an MTPG environment with otherwise homogeneous groups reduces the probability of coordination and average payoffs. (2) Introducing endowment heterogeneity into an MTPG environment with heterogeneous preferences increases the probability of coordination and average payoffs.

Combined with Hypotheses 1, 4 gives insight into whether focusing on wealthy interests can increase coordination, public good success, and total payoffs.

4. Experimental design

Our experiment introduces donor heterogeneity in endowments and preferences into a threshold public goods game with multiple viable alternatives. The experiment includes four distinct treatments using a between-subject design:

- *P&E_Diff Treatment* — There is donor heterogeneity in both preferences (regarding the bonuses realized from successfully funding a public good) and endowed income.
- *P_Diff Treatment* — There is donor heterogeneity only in preferences. All subjects are assigned the same endowed income.
- *E_Diff Treatment* - There is donor heterogeneity only in endowed income. All subjects are assigned identical payoff functions for each of the public goods.
- *Homogeneous Treatment* — There is no donor heterogeneity, with all subjects assigned identical payoff structures and endowments. This treatment is similar in structure to previous multiple threshold public goods experiments.

A total of 240 subjects participated in the experiment, with 60 individuals in each of the four treatments. Each treatment had five sessions with 12 subjects divided into unchanging groups of four people. This implies that, for each treatment, we collected data on 15 independent groups. Each group interacts repeatedly over 12 periods.

Endowments: Within each treatment session, individuals are first assigned an endowment, y_j, that remains their per-period endowment for each of the 12 periods. In treatments *P&E_Diff* and *E_Diff*, the four members of each group are randomly assigned four different endowment levels, $y_j \in \{34, 48, 62, 76\}$. In treatments *P_Diff* and *Homogeneous*, all four group members are assigned $y_j = 55$. In all four treatments, total per-period endowments equal 220 tokens.

Public Goods and Payoffs: In each of the 12 periods of the game, individuals simultaneously choose how much of their endowment to contribute to each of the eight public goods. Any amount that an individual does not contribute to a public good goes to a private account, which returns a private payoff of two points per token after each period. Donations to a public good benefit the group if total contributions are at least $\tau = 132$, a threshold representing 60% the total available tokens. When a threshold is reached, each group member receives a payoff of one point per token contributed (by anyone), plus an individual bonus $b_{j,n}$.

Four public goods are clearly inferior to the others, providing a uniform bonus of 20 points. These are called "non-selected" alternatives and are included to make the environment appear more complex with a richer array of options. However, the subjects universally ignore these less efficient options. The other four public goods provide higher bonuses that may differ across individuals depending on treatments. These are called "selected" options. In treatments *E_Diff* and *Homogeneous*, all four selected options provide uniform bonuses of 30 points when their threshold is reached. In treatments *P&E_Diff* and *P_Diff*, the four group members are each assigned a different selected option from which they will receive a higher bonus of 39 points if implemented. From the other selected goods, they receive a bonus of 27 points if implemented. In all treatments, the average bonus is 30 points, and the payoff from successfully implementing any select public goods is equal.

4.1. Procedures

We ran the experiment in February 2021 using a "lab-on-the-web" environment (Buso et al., 2020) in response to COVID-19 restrictions. Subjects were required to join a Zoom session from a computer with a well-functioning internet connection, webcam, microphone, and audio. They were instructed to connect from an isolated and quiet room and to remain seated throughout the experiment. Upon arrival, subjects joined individual waiting rooms that guaranteed anonymity. After ascertaining participants' identities and checking the quality of their digital infrastructure, experimenters disabled the subjects' webcam and microphone and made their Zoom profiles anonymous by removing any possible distinctive element (such as pictures, colors, initials) and assigning a random identification number. Then, subjects moved to the experimental 'room' where they could communicate with the experimenter through a Zoom chat but could not communicate with other subjects.

At the beginning of the experiment, experimenters shared their video and read the instructions aloud (Appendix C includes the English translation of the *P&E_Diff* instructions). Before the first period started, subjects answered control questions at their terminal. When necessary, answers to the questions were privately checked and explained through the chat. Subjects could click a button and access a table summarizing the instructions anytime.

At the beginning of each period, the computer showed each subject nine boxes, one for the private account and eight for the collective accounts. To avoid framing effects, we presented the eight collective accounts to subjects using neutral color names. Moreover, the order in which the collective accounts appeared on the screen was randomly determined by the computer for each subject. Finally, each of the eight boxes of the collective accounts showed the threshold and the size of the corresponding bonus. Given the nine boxes, every subject chose how to allocate their endowment entirely in each period over the alternative accounts.

In treatments with heterogeneity, assigned endowments and preferences were common knowledge. In particular, at the beginning of each session, subjects were randomly assigned one of four letters, either A, B, C, or D. In *E_Diff* and *P&E_Diff*, the order of the letters matched the order of the endowments, with A and D being respectively associated with the lowest (34 tokens) and highest (76 tokens) endowments. To facilitate subjects' assimilation of the information, a summary table reporting, for each letter, the corresponding endowment and, in *P&E_Diff*

Table 1
Contributions and coordination on public goods: descriptive statistics.

	Homogeneous	*P_Diff*	*E_Diff*	*P&E_Diff*
Coordination on Selected PGs	0.500	0.344	0.539	0.567
PG preferred by A	0.211	0.161	0.156	0.017
PG preferred by B	0.050	0.150	0.089	0.000
PG preferred by C	0.039	0.000	0.028	0.006
PG preferred by D	0.200	0.033	0.267	0.544
Coordination on Non-Selected PGs	0.000	0.000	0.000	0.000
Obs. (per treatment)	180	180	180	180
Total Contribution	32.474	29.435	32.169	34.022
	(19.722)	(21.608)	(22.696)	(23.766)
Contribution to Selected PGs	31.200	28.574	31.674	33.519
	(20.171)	(21.525)	(22.649)	(23.879)
Contribution to Non-Selected PGs	1.274	0.861	0.496	0.503
	(6.975)	(5.385)	(3.369)	(3.151)
Obs. (per treatment)	720	720	720	720

Notes. This table reports, for each treatment, the proportion of successful coordination on selected and non-selected public goods, as well as on each of the four selected public goods according to the preferences of the subject types. Since the color assignment of the public goods has been kept unchanged across treatments, the preferred alternatives in *Homogeneous* and *E_Diff* are defined by matching the color of the corresponding benchmarks in the two treatments with heterogeneous preferences, *P_Diff* and *P&E_Diff*. The table also reports the mean (total) contribution (standard deviations are reported in parentheses) to all public goods and what contributed to the selected and the non-selected alternatives separately.

and *P_Diff*, the corresponding preferred collective account was included in the screen used by subjects to make their choices.[10]

We kept the assignment of colors to the selected and non-selected public goods to each group unchanged across sessions to enhance comparability across treatments and rule out potential framing effects related to the particular color distribution used in the experiment. This feature of our experimental design allowed us to compare, group by group, the coordination rate and the contribution to the type-specific preferred public goods in *P&E_Diff* and *P_Diff* to the corresponding benchmarks in *E_Diff* and *Homogeneous*.

At the end of every period, each subject was informed about the number of tokens allocated by the group to (each of) the collective account(s), whether the corresponding threshold was reached, and any bonus paid. Additionally, after each period, subjects learned the total points they received from each account and in total. At the end of the experiment, subjects were privately paid one euro per 100 points.

On average, subjects earned 14.42 euros (including a show-up fee of three euros) for approximately 90 minutes. All payments were made through PayPal. Participants were drawn from the subject pool of the VERA-lab of the University of Venice, "Ca' Foscari" (Italy), including more than 2500 potential subjects. Participants were mainly undergraduate students in Economics, Management, Language Studies, and Philosophy, and they were recruited using ORSEE (Greiner, 2015). We programmed the experiment using z-Tree Unleashed (Duch et al., 2020).

5. Experimental results

In the statistical analysis, we use both non-parametric and parametric techniques. The non-parametric tests are based on 15 independent observations at the group level per treatment. Conclusions of the non-parametric tests are based on exact p-values. Similarly, to account for potential dependence across periods, the estimated coefficients in the parametric regressions are based on standard errors clustered at the group level.

The following analysis is conducted by pooling together the 12 experiment periods. In Appendix B, we include several tables replicating the analysis on two subsets of periods, namely 1–3 and 10–12. Despite some differences in magnitude, all the results remain qualitatively unchanged when considering each subset separately.

5.1. To which public goods do group members contribute?

Table 1 reports the proportion of successful contributions to selected and non-selected public goods over all periods for each treatment.

P&E_Diff is the treatment with the highest coordination rate (56.7%), followed by *E_Diff* (53.9%), *Homogeneous* (50.0%), and *P_Diff* (34.4%). In all treatments, groups coordinated exclusively on selected public goods.[11]

Table 1 shows the distribution of successful coordination over the four selected public goods in every treatment. Conditional on having reached the threshold, group members in *P&E_Diff* coordinate their contributions on the public good preferred by the wealthiest subject, D, around 96% of the time, with this proportion being higher than in any other treatment (according to a two-sided proportion test, $p < 0.001$ for any pairwise comparisons between *P&E_Diff* and the other treatments).[12]

To further validate this result, Table 2 unpacks, for each type of subject in *P&E_Diff*, the mean contribution to each of the four selected public goods[13]. Note again that subject A has the lowest endowment, and subject D has the highest.

The public good preferred by the wealthiest subject attracts the contributions of other group members. Indeed, all types of subjects contribute significantly more to the public good preferred by D than to any of the remaining three selected public goods (according to a two-sided Wilcoxon signed-rank test, when comparing the amount contributed to the public good preferred by D to any other alternative, $p < 0.01$ for each type of subject), indicating that A, B, and C are willing to not contribute to their own preferred goods to reach coordination on

[10] A screenshot of the choice screen used in *P&E_Diff* is included in Appendix C.

[11] In line with this result, contributions to selected public goods are significantly higher than those allocated to non-selected alternatives (according to a two-sided Wilcoxon signed rank, $p < 0.001$ in all treatments).

[12] Table B.1 performs parametric analysis to investigate to which public good successful coordination occurs more frequently. In particular, the first column reports results from an intercept-only regression focusing on groups that successfully fund a public good and using as a dependent variable a dummy that takes a value of 1 if the funded public good is the one preferred by the richest subject D and 0 otherwise (*Coord_pgRICH*). The estimate of the constant term, expressing the proportion of groups successfully funding the public good preferred by the richest subject D, is 0.918, which, according to a two-sided Wald test, is significantly higher than 0.5 ($p < 0.001$).

[13] Appendix Tables B.2 and B.3 respectively replicate the analysis in Tables 1 and 2 on periods 1–3 and 10–12. Results reported in the previous analysis are qualitatively confirmed when focusing on these subsets of periods

Table 2
Type-specific contributions to the selected public goods in *P&E_Diff*.

P&E_Diff				
	A	B	C	D
PG preferred by A	2.522	2.250	2.828	2.422
	(7.278)	(8.519)	(9.841)	(10.446)
PG preferred by B	0.061	2.411	0.250	0.711
	(0.498)	(6.657)	(1.264)	(4.045)
PG preferred by C	0.361	1.356	4.372	1.372
	(2.033)	(4.301)	(13.397)	(6.401)
PG preferred by D	16.561	18.517	32.661	45.422
	(13.969)	(17.706)	(24.599)	(30.061)
Obs.	180	180	180	180

Notes. This table reports, for each subject type, the mean contribution (standard deviations are reported in parentheses) to the four selected public goods in *P&E_Diff*.

one alternative.[14] As expected, the focus on the public good preferred by *D* is observed only in *P&E_Diff*, where preference heterogeneity is combined with endowment heterogeneity.

Result 1. In *P&E_Diff*, all subject-types contribute substantially more to the public good preferred by the wealthiest group member than to any other alternative.

Result 1 continues to hold when focusing on just the first period, suggesting that groups focus on the preferred option of the wealthiest member from their first interaction (even before the wealthiest member has a chance to disproportionately fund their preferred good). Indeed, by restricting attention to the contribution choices of subjects *A*, *B*, and *C* (thus excluding the wealthiest group member, *D*) in the first period, a two-sided Wilcoxon signed-rank test confirms that the contribution to the public good preferred by *D* (42.33 tokens), is significantly higher than what contributed to the alternative preferred by *A* (11.40, $p = 0.009$), *B* (7.80, $p = 0.003$), or *C* (23.07, $p = 0.095$). Consistently with the previous empirical observation, we also find that the number of group members (excluding *D*) contributing at least one token to the public good preferred by *D* in the first period (28) is significantly higher than the corresponding number associated with the alternatives preferred by *A* (15, $p = 0.058$), *B* (9, $p = 0.002$), or *C* (14, $p = 0.020$).

These findings corroborate the empirical validity of Hypothesis 1, whereby in *P&E_Diff*, the public good preferred by the wealthiest subject represents an effective coordination device to facilitate the selection of a public good to fund jointly. Other empirical observations provide further insight into the dynamics of successful contributions in the four treatments. First, we find strong path dependence in coordination, as group members keep contributing to the same public good on which they reached coordination in the early periods. Indeed, of the 60 groups in the experiment, 9 (15.00%) never reached coordination, 49 (81.67%) are non-switching and reached coordination always on the same alternative across periods, and only 2 (3.33%) switched coordination from one public good to another during the 12 periods.[15]

Second, even when groups do not successfully fund a public good in the initial periods, they look to "unsuccessful" contributions in early periods to select the alternative on which to attempt coordination in later periods. Indeed, by focusing on the non-switching groups, subjects reach coordination on the public good that attracted the highest level of contributions in the first period (occurring in 76.92%, 85.71%, 84.62%, and 44.44% of the groups in *P&E_Diff*, *E_Diff*, *Homogeneous*, and *P_Diff*, respectively). The evidence is even stronger when focusing on the second period (occurring in 92.31%, 85.71%, 66.67%, and 100% of the cases in *P&E_Diff*, *E_Diff*, *P_Diff*, and *Homogeneous*, respectively).

5.2. How do groups split the costs of public goods?

The previous results considered public good selection. We now consider how group members split the cost of funding public goods. In particular, we are interested in assessing the empirical validity of Hypotheses 2 and 3, identifying the endowment level and the size of the bonus assigned by the funded public good, respectively, as the main drivers of the ability-to-pay and benefit-focused contributions in the treatments introducing heterogeneity.

Hypothesis 2 predicts that agents with higher endowments contribute more than those with lower endowments. Hypothesis 3 predicts that agents who receive higher payouts from a successful public good contribute a larger share of the funding for that good.

Table 3 parametrically investigates the determinants of individual contributions in *E_Diff*, *P_Diff*, and *P&E_Diff* when focusing on the groups with high coordination success over the 12 periods of the experiment.[16] Specifically, for each treatment, HC denotes the groups that successfully coordinated for a number of periods greater than (or equal to) the median in the treatment. Conversely, LC denotes the groups that successfully coordinated for fewer than the median number of periods. The Appendix shows that the analysis in Table 3 is robust to including LC groups in the analysis.[17]

For each treatment, we consider two different specifications. The first specification tests the empirical validity of Hypotheses 2 and 3 by including, respectively, the subject's endowment and the bonus assigned to them by the funded public good. The second specification checks the robustness of the results over time by separately assessing the effect of the two contribution drivers in the first six and the last six periods.

Columns (1) and (2) provide evidence in favor of the ability-to-pay hypothesis in *E_Diff*, as a higher endowment corresponds to a higher willingness to contribute. Specifically, the coefficient of *Endowment* is positive and highly significant in both columns ($p < 0.001$), just as it is the linear combination between *Endowment* and *Endowment* × *Last six periods* in the second column ($p < 0.001$). Therefore, ability-to-pay is a strong determinant of individual contributions in *E_Diff*, and its effect is stable across the experiment's first and second parts.

Similarly, columns (3) and (4) support the idea that, in *P_Diff*, a subject contributes more when the funded public good is the alternative assigning her the higher bonus. The coefficient of *Assigned bonus* is positive and highly significant in both columns ($p < 0.001$). Again, the fact that also the linear combination between *Assigned bonus* and *Assigned bonus* × *Last six periods* in the fourth column is significant ($p = 0.061$) suggests that the effect of the bonus assigned by the funded alternative

[14] In Table B.1, we report intercept-only regressions to parametrically validate the previous empirical observations. Specifically, in regressions reported in columns (2)–(4), the dependent variable is *Contr_diff*, namely the difference between the contribution made by the subject to the public good preferred by the wealthy agent *D* and what she overall contributes to the three public goods preferred by *A, B, C*. From the regression in column (2), we find that the constant is positive and highly significant ($p < 0.001$). In other words, each subject in *P&E_Diff* contributes more on average to the public good preferred by the richest subject than to the other three public goods.

[15] The two switching groups exhibited a relatively low success rate at coordinating contributions. The first group participating in *P&E_Diff* reached coordination in 6 periods (5 on one public good and 1 on another alternative), while the second group participating in *P_Diff* reached coordination in (only) 3 periods. Among the 9 groups that never reached coordination, 5 participated in *P_Diff*, 2 in *Homogeneous*, 1 in *E_Diff*, and 1 in *P&E_Diff*.

[16] Focusing on HC–groups allows us to investigate the determinants of contributions in successful groups, thus filtering out the noise that is due to coordination failure. We added this analysis to the evaluation plan after preregistration. The results are qualitatively confirmed when pooling all groups (see Table B.5 in the Appendix).

[17] Tables B.4–B.9 in Appendix B replicate the parametric analysis in Table 3 (i) on periods 1–3 and 10–12 (ii) by including all groups, (iii) by considering only LC groups, and (iv) by replacing the individual total contribution with the amount contributed to the funded public good as the dependent variable. These robustness checks confirm all the main results of Table 3.

Table 3
Determinants of total contributions in HC groups in *E_Diff*, *P_Diff* and in *P&E_Diff*: parametric results.

Total contribution	*E_Diff*		*P_Diff*		*P&E_Diff*	
	(1)	(2)	(3)	(4)	(5)	(6)
Endowment	0.770***	0.793***			0.880***	0.853***
	(0.132)	(0.139)			(0.108)	(0.115)
Assigned bonus			0.274***	0.325***	0.366***	0.469***
			(0.051)	(0.073)	(0.048)	(0.059)
Last 6 periods		1.780		3.883		−3.197
		(5.080)		(2.724)		(4.739)
Endowment × *Last 6 periods*		−0.046				0.047
		(0.089)				(0.082)
Assigned bonus × *Last 6 periods*				−0.159		−0.137
				(0.113)		(0.134)
Constant	−4.426	−5.315	32.976***	32.073***	−17.663***	−16.257**
	(7.529)	(7.946)	(1.979)	(2.084)	(6.199)	(6.557)
ll	−1582.90	−1582.61	−1601.32	−1600.20	−1742.91	−1737.58
$Wald - \chi^2$	34.180	34.750	28.420	30.810	135.760	148.310
$p > \chi^2$	0.000	0.000	0.000	0.000	0.000	0.000
Obs.	384	384	384	384	432	432
N. groups	8	8	8	8	9	9

Notes. This table reports coefficient estimates (standard errors in parentheses) from two-way linear random effects models accounting for potential individual dependency over periods and dependency within the group. The dependent variable is the total contribution made by the subject in a HC group to the eight collective accounts in the period. *Endowment* is the endowment in tokens of the subject. *Assigned bonus* is the bonus assigned to the subject by the funded public good. *Last 6 periods* is a dummy that takes a value of 1 in the last six periods of the experiment and 0 o/w. *Endowment* × *Last 6 periods* and *Assigned bonus* × *Last 6 periods* are interaction terms. Significance levels are denoted as follows: * $p < 0.1$, **$p < 0.05$, and *** $p < 0.01$.

on individual contributions persists, though at a lower extent, in the second part of the experiment. The loss of statistical significance in the last six periods may be due to changing expectations about the contribution shares once coordination is reached and maintained for several periods.

P&E_Diff includes both sources of heterogeneity. Therefore, results reported in columns (5) and (6) allow us to separately identify the role played by the two drivers in determining subjects' contributions. Results confirm that individual contributions are determined by both the subject's endowment (ability-to-pay-focused contributions) and the size of the bonus assigned by the funded public good (benefit-focused contributions). In column (5), both the coefficients of *Endowment* and *Assigned bonus* are positive and highly significant (in both cases, $p < 0.001$). In line with the previous results, column (6) confirms that the effects of the two contribution drivers are highly significant in the first six periods (in both cases, $p < 0.001$) and remain so in the last six periods of the experiment ($p < 0.001$ for the linear combination between *Endowment* and *Endowment* × *Last six periods*, $p = 0.006$ for the linear combination between *Assigned bonus* and *Assigned bonus* × *Last six periods*).

These results suggest that successful groups divide costs in a highly progressive way. Specifically, those with higher endowments make substantially larger contributions, substantially offsetting their endowment advantage. Additionally, the contribution patterns also largely offset differences in benefits received, whereby those receiving higher bonuses contribute more to the good. We summarize the previous evidence in the following result, which, in turn, provides empirical support in favor of Hypotheses 2 and 3.

Result 2. The drivers of individual contributions. The subject's contribution increases in both the level of her endowment (ability-to-pay-focused contributions) and the size of the bonus assigned to her by the funded public good (benefit-focused contributions).

Fig. 1 further confirms the positive relationship between the subject's contribution and her endowment documented in the two treatments with endowment heterogeneity, *E_Diff* and *P&E_Diff*. In particular, the figure reports, for each treatment, the average contribution of each type of player in the HC groups across the 12 periods of the experiment.[18]

There is a positive relationship between contributions and endowments in *E_Diff* and *P&E_Diff*, whereby the wealthiest subject D makes the largest contribution (61.907 in *P&E_Diff* and 55.979 in *E_Diff*), followed by C (44.611 in *P&E_Diff* and 41.354 in *E_Diff*), B (25.462 in *P&E_Diff* and 30.687 in *E_Diff*) and A, the poorest subject in the group (23.925 in *P&E_Diff* and 23.614 in *E_Diff*).

In Table B.10 included in Appendix B, we report parametric results confirming this descriptive evidence. Our estimates show that, in both treatments with endowment heterogeneity, the wealthiest subject D in HC groups makes significantly higher contributions than the other group members (for any pairwise comparison between D and the other subjects, $p < 0.01$).[19]

Finally, in line with existing studies that analyze the effects of endowment heterogeneity in threshold public good settings (see for instance, Rapoport and Suleiman, 1993), the differences in individual contributions in *P&E_Diff* and *E_Diff* are associated with the fact that subject-types tend to contribute a similar fraction of their endowments. Indeed, when considering individual contributions relative to the endowment level, differences across subject types disappear in both *E_Diff* and *P&E_Diff*. The relative contributions in the HC groups are included between 0.530 (subject B) and 0.815 (subject D) in *P&E_Diff*, and between 0.639 (subject B) and 0.737 (subject D) in *E_Diff*, respectively. The only remarkable observation is that B in *P&E_Diff* contributes less than any other subject-type ($p = 0.058$ for A; $p = 0.038$ for C; $p = 0.002$

[18] In Appendix B, we include two additional figures. Fig. B.1 adds the corresponding graphs for the two treatments with no endowment heterogeneity, *Homogeneous* and *P_Diff*. We document no remarkable association between subject types and contributions in these two treatments. Interestingly, only in *Homogeneous* do we observe a tendency for subject A to make larger contributions than the other group members. In Fig. B.2, we replicate the graphical representation by focusing only on LC groups. Here, the relationship between contributions and endowments in *E_Diff* and *P&E_Diff* is much weaker than in HC groups.

[19] For completeness, Table B.10 also reports estimates for the other two treatments with no endowment heterogeneity, *Homogeneous* and *P_Diff*.

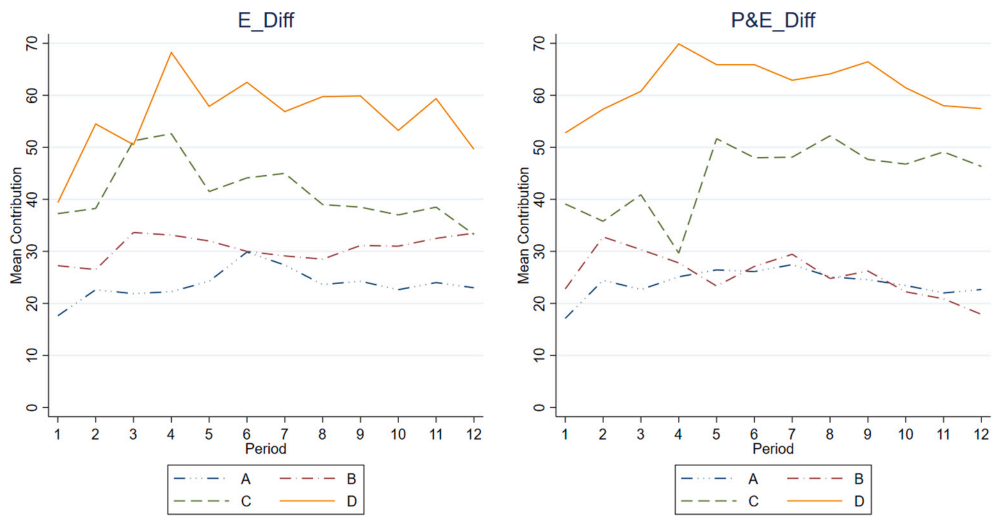

Fig. 1. Total contributions in HC groups by subject-types in *E_Diff* and *P&E_Diff*.

for *D*). Any other pairwise comparison between subject types does not yield significant results.[20]

5.3. Welfare considerations in treatments with endowment heterogeneity

Results 1 and 2 have important welfare implications for group members in the two treatments characterized by endowment heterogeneity. In *E_Diff*, the wealthiest subject *D* contributes more than any other group member to fund a public good successfully. The higher propensity of the wealthiest subject to contribute, together with the fact that, in *E_Diff*, every group member receives the same payoff from the funded public good, imply that reaching the threshold on one alternative is not only beneficial for all group members but also reduces within-group welfare inequality.

In *P&E_Diff*, the wealthiest subject potentially contributes more than the other group members because she has a higher endowment and because the contributions fund her preferred public good. This implies that the alternative preferred by the wealthiest agent becomes an effective coordination device for the other group members. Therefore, redirecting contributions to the public good preferred by the wealthiest agent makes it more likely that all group members benefit from the returns of a public good they would not have gained otherwise. In addition, the combination between the ability-to-pay and the benefit-focused contributions of the wealthiest agent exacerbates the effects on welfare distribution within the group. Indeed, while the former contribution driver moves towards leveling out differences in welfare due to endowment heterogeneity, the latter mitigates the differences in welfare from the wealthiest agent receiving a higher bonus from the funded public good.

Table 4 parametrically studies the welfare distribution across group members in the two treatments with endowment heterogeneity, *E_Diff* and *P&E_Diff*.[21] We consider a series of specifications highlighting how the welfare distribution changes when comparing HC groups with LC groups.

Estimates document three important results. First, in both *E_Diff* and *P&E_Diff*, and for every subject-type, profits are higher in HC groups than in LC groups (for *A*, *B*, and *C*, in both treatments, $p < 0.001$; for *D*, in both treatments, $p < 0.05$), thus confirming the positive effect on welfare of successfully funding a public good.[22]

Table 4
Profits of the subject-types in *P&E_Diff* and *E_Diff*: parametric results.

Profit	*P&E_Diff*	*E_Diff*
B	3.222	9.048
	(12.695)	(13.336)
C	15.388	23.643*
	(12.695)	(13.336)
D	47.167***	54.524***
	(12.695)	(13.336)
HC	67.019***	71.286***
	(14.496)	(14.101)
B × *HC*	21.703	4.806
	(16.390)	(18.261)
C × *HC*	−0.759	−3.122
	(16.390)	(18.261)
D × *HC*	−30.130*	−35.252*
	(16.390)	(18.261)
Constant	95.278***	92.131***
	(11.229)	(10.298)
ll	−4150.271	−4166.598
$Wald-\chi^2$	61.59	76.26
$p > \chi^2$	0.000	0.000
Observations	720	720
Number of groups	15	15

Notes. This table reports coefficient estimates (standard errors in parentheses) from two-way linear random effects models accounting for both potential individual dependency over periods and dependency within the group. The dependent variable is the profit obtained by the subject in the period. *B*, *C*, and *D* are subject-types dummies. *HC* is a dummy that takes a value of 1 if the subject belongs to a *HC* group and 0 o/w. *B* × *HC*, *C* × *HC*, and *D* × *HC* are interaction terms. Significance levels are denoted as follows: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Second, in both treatments, every subject type in HC groups obtains a higher profit than they would in the zero-contribution equilibrium (in all cases, $p < 0.01$). Instead, when focusing on LC groups, only *A* obtains significantly higher profits than what is implied by the zero-contribution equilibrium ($p = 0.015$ in *P&E_Diff* and $p = 0.019$ in *E_Diff*).[23]

Third, as discussed above, reaching the threshold on the alternative preferred by the wealthiest agent benefits all group members and reduces welfare inequality within their group. In line with this observation, when focusing on LC groups, in both treatments with

[20] Results of the parametric analysis conducted on relative contributions are available upon request.

[21] Table B.11 replicates the analysis in Table 4 on periods 1–3 and 10–12.

[22] According to a two-sided Mann–Whitney rank-sum test, $p < 0.01$ in all cases but for *D* in *E_Diff* for which $p = 0.021$.

[23] According to a two-sided Wilcoxon signed-rank when focusing on HC groups: $p < 0.01$ for all subject types in both *P&E_Diff* and *E_Diff*. When considering LC groups, $p > 0.1$ in all cases except for *A* ($p = 0.094$ in *P&E_Diff* and $p = 0.078$ in *E_Diff*).

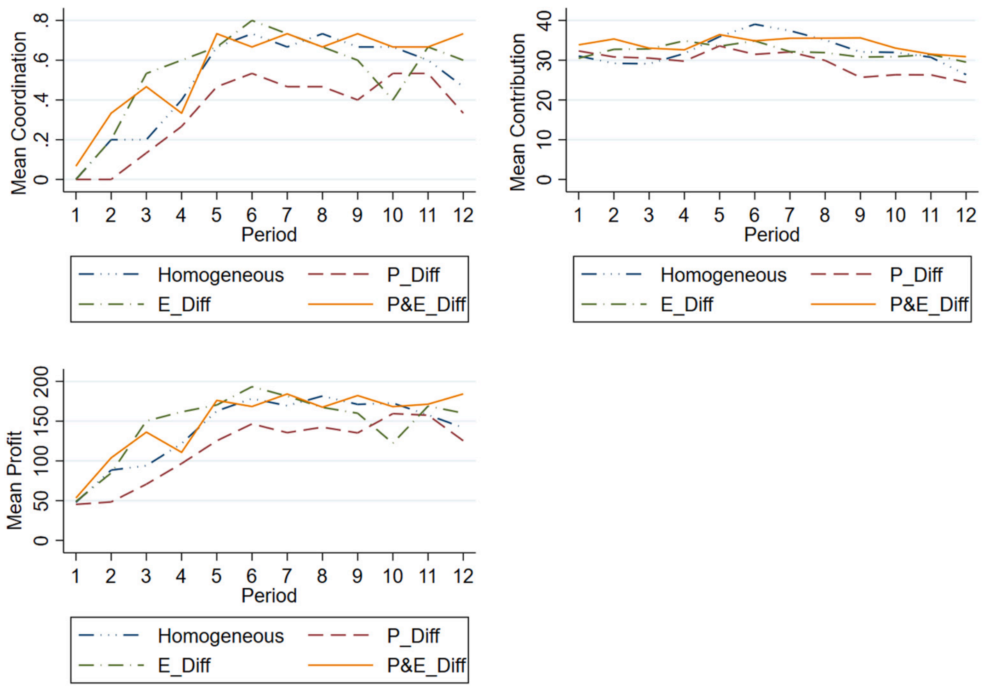

Fig. 2. Coordination, contributions, and profits in the four treatments.

heterogeneous endowments the profits of the wealthiest subject D turn out to be higher than what obtained by any other group member (in both treatments, $p < 0.001$ for the difference between A and D, and $p < 0.01$ for the difference between B and D; $p < 0.05$ for the difference between C and D).[24] Instead, when considering HC groups, we detect no significant differences in profits between D and any other group member in both treatments (in all cases, $p > 0.1$).

Result 3. In the two treatments with endowment heterogeneity, *E_Diff* and *P&E_Diff*, all group members benefit from successful coordination. Moreover, welfare inequality across members is much lower in groups experiencing strong coordination than in groups that perform poorly.

The results on welfare distribution are further confirmed through standard measures for income inequality. Specifically, we use data on subjects' profits to compute the Gini index for each group and in each experiment period. In both treatments with endowment heterogeneity, the Gini index is substantially lower in HC groups than in LC groups, suggesting that groups experiencing strong coordination exhibit lower payoff inequality than groups performing poorly. Indeed, when focusing on *P&E_Diff*, the mean of the index decreases from 0.233 in LC groups to 0.131 in HC groups. Similarly, in *E_Diff*, the mean of the index passes from 0.242 in LC groups to 0.154 in HC groups.[25]

5.4. Coordination, contributions, and profits: differences across treatments

Next, we look at differences in contributions, coordination, and profits (defined as the overall final earnings obtained by each subject at the end of each period) across the four treatments. The primary aim of this analysis is to test Hypothesis 4 and whether heterogeneity helps or hinders coordination.

Fig. 2 shows the mean total contributions to the public goods, the proportion of successful coordination, and the mean profits in the four treatments over periods.

Apart from the low performance of *P_Diff* in successful coordination and profits, we do not observe any remarkable difference in the three dimensions across treatments. Thus, relative to *Homogeneous*, introducing endowment heterogeneity plays no role in determining either the amount of resources allocated by group members to the public goods or the ability of the groups to successfully coordinate on the same viable alternative. The most remarkable descriptive observation concerns the difference in both profits and successful coordination between *P_Diff* and *P&E_Diff*. In other words, introducing endowment heterogeneity cancels the adverse effects that differences in preferences across group members *per se* have on group interaction and coordination. Table 5 parametrically investigates the empirical validity of these preliminary observations.

We use estimates in column (1) to perform pairwise comparisons between treatments in the ability to coordinate contributions on the same public good. We detect no significant differences between *Homogeneous* and any other treatment, or between *E_Diff* and *P&E_Diff* (in all cases, $p > 0.1$). The only significant differences are between *P_Diff* and *E_Diff* ($p = 0.059$), and between *P_Diff* and *P&E_Diff* ($p = 0.033$).

In column (2), we add the dummy HC and the corresponding interactions with the treatment dummies to assess differences across treatments in HC and LC groups. When focusing on HC groups, we find that subjects coordinate less in *P_Diff* than in *E_Diff* ($p = 0.015$) and in *P&E_Diff* ($p = 0.028$). All the remaining pairwise comparisons yield insignificant results ($p > 0.1$). Moving to LC groups, subjects in *P_Diff* coordinate significantly less than in any other treatment ($p < 0.01$ for *E_Diff* and *P&E_Diff*; $p = 0.069$ for *Homogeneous*), thus confirming that introducing heterogeneity in preferences alone makes coordination more difficult to reach. We do not detect any other significant pairwise comparison.

[24] According to a two-sided Wilcoxon signed-rank, when considering LC groups, in *P&E_Diff*, $p = 0.031$ for both the differences between D and A and between D and B, $p = 0.094$ for the difference between D and C. In *E_Diff*, $p = 0.031$ for the difference between D and A, and $p = 0.016$ for the difference between D and B.

[25] According to a two-sided Mann–Whitney rank-sum test, for the difference in the Gini index between LC and HC groups, $p = 0.005$ in *P&E_Diff* and $p = 0.021$ in *E_Diff*.

Table 5
Coordination, contribution, and profits in the four treatments: parametric results.

	Coord (1)	*Coord* (2)	*Total contribution* (3)	*Total contribution* (4)	*Profit* (5)	*Profit* (6)
P_Diff	−0.156	−0.177*	−3.039	−5.283	−24.928*	−21.508*
	(0.104)	(0.097)	(3.572)	(4.046)	(13.810)	(11.307)
E_Diff	0.039	0.061	−0.304	−0.526	6.836	11.920
	(0.098)	(0.108)	(3.572)	(4.046)	(13.810)	(11.307)
P&E_Diff	0.067	0.056	1.549	1.507	9.914	9.708
	(0.099)	(0.111)	(3.572)	(4.199)	(13.810)	(11.734)
HC		0.440***		12.317***		64.379***
		(0.096)		(3.833)		(10.712)
P_Diff × *HC*		0.094		5.746		1.635
		(0.116)		(5.373)		(15.013)
E_Diff × *HC*		0.012		−0.018		−1.486
		(0.120)		(5.373)		(15.013)
P&E_Diff × *HC*		0.190		0.069		0.342
		(0.126)		(5.421)		(15.149)
Constant	0.500***	0.236***	32.474***	25.083***	140.642***	102.013***
	(0.070)	(0.090)	(2.526)	(2.969)	(9.765)	(8.297)
ll			−12303.93	−12283.22	−16661.27	−16624.00
$Wald-\chi^2$	5.290	275.40	1.710	57.55	7.860	174.98
$p>\chi^2$	0.152	0.000	0.634	0.000	0.049	0.000
Obs.	720	720	2,880	2,880	2,880	2,880
N. groups	60	60	60	60	60	60

Notes. Columns (1) and (2) report coefficient estimates from a linear probability model (standard errors clustered at the group level in parentheses). The dependent variable is *coord*, a dummy that takes a value of 1 if the group reaches the threshold and 0 otherwise. Columns (3) - (6) report coefficient estimates (standard errors in parentheses) from two-way linear random effects models accounting for both potential individual dependency over periods and dependency within the group. The dependent variable in columns (3) and (4) is the total contribution made by the subject to the eight public goods in a period. The dependent variable in columns (5) and (6) is the profit obtained by the subject in a period. *P_Diff*, *E_Diff* and *P&E_Diff* are treatment dummies. *HC* is a dummy that takes a value of 1 if the subject belongs to a *HC* group and 0 o/w. *P_Diff* × *HC*, *E_Diff* × *HC*, and *P&E_Diff* × *HC* are interaction terms. Significance levels are denoted as follows: * $p<0.1$, **$p<0.05$, and *** $p<0.01$.

In column (3), we parametrically assess differences in contributions across treatments. We detect negligible differences as any pairwise comparison yields no significant results ($p > 0.1$ for the differences between *Homogeneous* the other treatments, between *P_Diff* and *E_Diff*, between *P_Diff* and *P&E_Diff*, and between *E_Diff* and *P&E_Diff*). When separately considering HC and LC groups in column (4), any pairwise comparison between treatments yields non-significant results.[26]

Finally, estimates reported in column (5) compare treatments in the per period profits obtained by group members. In line with the conjecture that preference heterogeneity complicates coordination, we find that profits in *P_Diff* are lower than in any other treatment (p = 0.071 for *Homogeneous*; p = 0.021 for *E_Diff*; p = 0.012 for *P&E_Diff*). When focusing on *Homogeneous*, *E_Diff*, and *P&E_Diff* only, there are no significant pairwise differences (in all cases, $p > 0.1$).

In the last column of the table, we analyze differences in earnings across treatments by separately considering HC and LC groups. Starting from HC groups, we find significantly higher profits in *P&E_Diff* and *E_Diff* than in *P_Diff* (in both cases, $p < 0.01$). We also detect higher profits in *Homogeneous* than in *P_Diff* ($p = 0.044$). Results in LC groups better highlight the coordination problems associated with preference heterogeneity. Indeed, we find that profits in *P_Diff* are significantly lower than in any other treatment ($p < 0.01$ for *E_Diff* and *P&E_Diff*; p = 0.057 for *Homogeneous*). We do not find any other significant difference between treatments.

We summarize the previous evidence in the following statement.

Result 4. Total contributions do not remarkably change across treatments. However, relative to the other treatments, evidence suggests that coordination and profits are lower in *P_Diff* than in the other treatments.

Result 4 qualitatively confirms the validity of the first part of Hypothesis 4 as, *ceteris paribus*, introducing preference heterogeneity adds complexity to the strategic interaction. It generates disagreement on which public good is preferred. Instead, endowment heterogeneity does not affect coordination and cooperation relative to the baseline setting with homogeneous agents. However, as documented by the comparison between *P_Diff* and *P&E_Diff*, adding endowment heterogeneity to the setting in which subjects differ in which public good they prefer the most mitigates the adverse effects on coordination exerted by preference misalignment.

Although presenting the expected sign, the magnitude of the effects exerted by the two sources of heterogeneity, taken separately, is relatively small. There are several aspects of the experimental design that may contribute to the limited magnitude of these effects. First, as discussed in the theoretical framework, heterogeneity in the two dimensions does not remarkably alter the equilibrium analysis for the baseline setting with homogeneous agents.[27] Second, independently from their preferences for public goods, all group members are better off in equilibrium with positive contributions than with the no-contribution outcome and have a relatively strong incentive to try to coordinate.[28] In other words, the effect of various factors on the salience of coordinating on the selected public goods in *Homogeneous* and on the wealthy-preferred good in *P&E_Diff* are similar in overall effect.

Finally, we have documented no remarkable differences in cooperation and coordination between *Homogeneous* and *P&E_Diff*. The

[26] There is only a marginally significant difference (p = 0.093) between *P&E_Diff* and *P_Diff* in *LC* groups.

[27] Indeed, not only do both treatments admit the same symmetric equilibrium in which subjects split the cost of funding the public good equally, but there is also a large number of asymmetric equilibria in which, regardless of their incomes and preferences, subjects make different contributions to reach the threshold.

[28] Additionally, consistent with Corazzini et al. (2015), the presence of low-bonus, non-selected goods in our experiment may increase the salience of the higher-bonus goods and make it less likely that donors focus on the no-contribution equilibrium.

evidence suggests that the coordination benefits associated with the presence of a potential focal point may not dominate the challenges associated with increased complexity or that the dynamics of coordination in *Homogeneous* did not provide much room for observable improvements in the frequency of coordination even with the addition of a focal point in *P&E_Diff*. Suppose first-period contributions themselves serve as a focal point for later-period observations. In that case, coordination after the first period may be just as likely in both *Homogeneous* and *P&E_Diff*, in which case the presence of a salient option in the first period primarily determines which public good succeeds, rather than a group's ability to achieve coordination.

6. Applications

6.1. Philanthropic giving

The preferences of the wealthy serve as a focal point enabling the broader donor base to consolidate their support on options where they expect their contributions to be less likely wasted.[29] Even though most donors prefer to focus on a different opportunity, they recognize that their contributions will not unilaterally effect change unless coordinated with others.

In international development and global health, for example, the largest funders, such as the Gates Foundation with its roughly $47 billion endowment (or other large private foundations and Western-country donor organizations such as USAID), directly control which causes, projects, or approaches to support with their funding. But, in doing so, they also indirectly steer the funds and efforts of other smaller foundations, organizations, or local governments who recognize that their initiatives are more likely to succeed when aligned with the larger donor's funding priorities. As McCoy and McGoey (2011) explains, "other donors look to the Gates Foundation in order to decide whether to fund a particular project or programme".[30] Our experiment shows how the tendency of groups to follow the preferences or actions of the wealthiest donor occurs not only on the global scale but also with localized or smaller-scale giving.

Although we see no evidence in our experiment that the effect makes any donors worse off, it does reduce the variety of public goods that receive contributions and succeed. In real-world donation environments, this reduction in variety could have important implications for social welfare if, for example, the preferences of the wealthiest donors are not representative of the broader needs of society. For example, this could be the case if donor preferences are driven by visibility or financial interests (or potentially national strategic interests in the case of country aid agencies) rather than broader societal needs. Such possibilities are discussed in surveys of wealthy donors (e.g., Konrath and Clark, 2020; Steuerle et al., 2018; Andrews et al., 2020) and political economy assessments of aid organizations (e.g., Rahman and Giessen, 2017).

6.2. Public finance

The distribution of contributions we observe in the experiment may loosely be interpreted as a distribution of tax payments adopted as groups work together to select and fund a public good and policy portfolio. Our experimental framework allows us to effectively observe the (voluntary) tax policy that emerges within heterogeneous groups working to collectively fund the social good.[31] We observe the emergence of a tax system in a simple environment, absent of politics or institutions. This work complements an extensive literature in public finance that has focused on the optimal design or relative merits of alternative tax policies (e.g. Musgrave, 1959; Lindahl, 1919; Mirrlees, 1971; Saez, 2011), on how context and institutions may affect the implementation of alternative systems (e.g. Feldstein, 1976; Ito and Krueger, 1992), and on efforts to measure individual preferences over alternative types of policies (e.g. Weinzierl, 2017; Kittel et al., 2017).

Successful groups converge to contribution patterns consistent with highly progressive tax schedules. Higher-income individuals tend to contribute enough to the public goods to offset their initial income advantage.

Formal tax commitments or equity politics do not drive such progressive divisions of costs. Instead, the progressive system emerges under a collective expectation that higher-income individuals will contribute relatively more than others to ensure collective success. Our results highlight a natural proclivity towards highly progressive tax systems, suggesting that such progressive systems tend to be more salient than alternative divisions.

Additionally, our experimental design allows us to formally consider how individual contributions reflect differences in the endowed income (ability-to-pay-focused contributions) versus differences in the bonus assigned by the funded public good (benefit-focused contributions). We show that successful groups tend to divide costs in ways that reflect individual differences in both ability to pay and benefits received.

Considering these features of tax policies has been ubiquitous in economics since Adam Smith first argued that individual tax burdens should be set "as nearly as possible in proportion to their respective abilities" (Smith, 1776). Empirically distinguishing the two drivers of individual participation in real-world tax systems is difficult because one's income (and thus their ability to pay) is affected by the economic benefits they receive from the system of government those taxes fund. Our experiment allows for such a distinction. Higher-income individuals contribute more to the public goods in a way that offsets their endowed income advantage but does not offset the extra benefits they receive from the implemented public good.[32]

Weinzierl (2017) reports results from a survey showing that large portions of people prefer classical benefit-based tax systems and do not support highly progressive systems that equate after-tax income. In other words, people widely *report* preferences that conflict with the highly progressive, ability-to-pay-based payments that emerge within our experiment. Our results are not, however, inconsistent with Weinzierl (2017). Instead, they reflect the fact that the outcomes in our experiment are not driven by individual preferences (which were the focus of Weinzierl, 2017), but rather by the collective expectations as to what will naturally emerge. In our experiment, even those who do not prefer highly progressive contributions will still voluntarily participate in such a system if they believe others expect them to do so.

The analysis contributes to a growing literature applying laboratory experiments to study policy choice and macroeconomics (see Duffy, 2016, for a survey). In our framework, policy (public good selection and

[29] In this respect, our study is also related to the literature studying competition between charities for donations (e.g., Becchetti et al., 2017; Meer, 2017; Filiz-Ozbay and Uler, 2019; Perroni et al., 2019; Aldashev et al., 2020; Schmitz, 2021; Deryugina and Marx, 2021) and crowdfunding public goods and charitable projects (e.g., Hudik and Chovanculiak, 2018; Cason and Zubrickas, 2019; Petruzzelli et al., 2019; Argo et al., 2020; Cason et al., 2021; Foerster and van der Weele, 2021). Nownes and Neeley (1996) shows how such considerations extend to political causes and how wealthier individuals may influence the political agenda by forming interest groups.

[30] Kessler et al. (2019) show how rich donors give more when they have more control over how the money will be used. See also Orbinski (2009), Rushton and Williams (2011), Faubion et al. (2011), Marquis et al. (2013), Birn (2014), Martens and Seitz (2015) and Smith et al. (2015).

[31] Unlike a typical tax system, the payments in our experiment are entirely voluntary, requiring no government enforcement and maintained through the incentives individuals have to do their part and ensure collective success.

[32] See Musgrave (1959), Weinzierl (2018), and Exley and Kessler (2024).

Table B.1
Coordination and type-specific preferences and contributions over public goods: parametric results.

	Coord_pgRICH	*Contr_diff*		
		Overall	1–3	10–12
Constant	0.918*** (0.071)	23.061*** (4.151)	10.067*** (4.810)	25.589*** (5.614)
Obs.	102	720	180	180
N.groups	15	15	15	15

Notes. The first column reports estimates of the constant (standard errors in parentheses) from a linear random effects model accounting for robust standard errors when groups successfully coordinate on one public good. *Coord_pgRICH* is a dummy that takes a value of 1 if the group successfully coordinated on the public good preferred by the richest subject, D, and 0 o/w. The analysis is run by only using observations of groups that successfully funded a public good. Columns (2)-(4) report estimates of the constant (standard errors in parentheses) from two-way linear random effects models accounting for both potential individual dependency over periods and dependency within the group. The dependent variable, $Contr\_diff$, is the difference between the contribution made by the subject to the public good preferred by the richest agent D and what she overall contributes to the three public goods preferred by the other group members A, B, C. Significance levels are denoted as follows: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

the effective tax schedule) emerges from the coordinated voluntary efforts of individuals in support of alternative options rather than through an explicit election or voting process integrated into the experimental design (e.g., Agranov and Palfrey, 2015; Jiménez-Jiménez et al., 2020; Frohlich and Oppenheimer, 1990; Riedl and van Winden, 2001, 2007; Cabrales et al., 2012; Sausgruber and Tyran, 2011; Blinder and Morgan, 2005, 2008; Feige et al., 2018; Grober and Reuben, 2013). Support for progressive and redistributive policies in other work is typically attributed to the repeated nature of the policy environment, where, for example, young generations support transfers to older generations, not wanting to shut down such a system before they become old (e.g., Offerman et al., 2001; van der Heijden et al., 1998). In our framework, even without repetition, wealthy individuals have incentives to do their part to ensure the success of (even highly progressive) policies they believe others support.

7. Conclusion

The paper introduces heterogeneity into an MTPG framework to study the selection and financing of mutually beneficial policy alternatives when individuals differ in their income and preferences. Our lab experiment identifies a bias favoring the public goods preferred by the wealthiest individual, suggesting that the perceived policy bias in favor of the wealthy persists even in the absence of corruption, government capture, or information asymmetries. At the same time, we observe highly progressive contribution patterns, with wealthier individuals tending to contribute larger shares of their income to help fund public goods, even when they do not receive extra benefits from that good and even though contributions are entirely voluntary.

Our framework contributes to the collective action literature by incorporating the coordinated selection of which action to jointly undertake. Which policy or project is implemented does not depend on the outcome of a formal political economy or social choice mechanism but results from informal coordination of voluntary effort. The framework is a coordination game in which individuals want to contribute consistently with group expectations. They want to play what they perceive to be their expected part to ensure public good success. Because of this, the observed behavior reflects people's expectations about which public good will be implemented and how much each person is expected to contribute, and it does not reflect their individual preferences over alternative outcomes. Group attention is drawn to the public good preferred by the wealthiest individual because people expect others will also focus on that good.

Our paper shows how the voluntary contribution MTPG experiments can be used to study questions in public finance, charitable giving, and policy selection. These and other applications may be further explored using extensions of the MTPG framework. Future work may extend our analysis to allow for alternative processes of policy selection (e.g., proposals and voting), replace endowments with earned income,[33] or incorporate communication, alternative timing, or different aspects of heterogeneity.

While preparing this work, the authors used Grammarly Pro to provide suggestions regarding spelling, grammar, and clarity. After using this tool, the authors reviewed and edited the content as needed. We take full responsibility for the content.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Queen's University General Research Ethics Board approval was acquired for this project, GECO-018-20. The experiment was pre-registered through OSF: https://doi.org/10.17605/OSF.IO/BRQV. The wording of the hypotheses has been edited to improve exposition, but the content is the same as was registered.

Luca Corazzini received funding for this project from the Social Sciences and Humanities Research Council of Canada (SSHRC), Grant # 435-5017-0573. He is a collaborator on that grant. He received additional support for this project through the VERA center of the Department of Economics, University of Venice.

Christopher Cotton received funding for this project from the Social Sciences and Humanities Research Council of Canada (SSHRC), Grant # 435-5017-0573. He is the PI on that grant. He receives research funds and salary support through my position as the Jarislowsky-Deutsch Chair in Economic and Financial Policy at Queen's. The funding comes from a university controlled endowment that was provided in part by the Jarislowsky Foundation.

Tommaso Reggiani received funding for this project from the Czech Science Foundation, Grant # GA20-06785S.

Data availability

Data will be made available on request.

Acknowledgments

We thank Diya Elizabeth Abraham, Michele Bernasconi, Katarína Čellárová, Michalis Drouvelis, Miloš Fišar, Ezgi Kaya, Valeria Maggian, Rainer Michael Rilke, participants at Cardiff's Academic Talks in Economics, the 5th WZB Berlin Virtual Workshop "Recent Advances in the Economics of Philanthropy," the 2022 European ESA Meeting in Bologna, the 2023 SASCA meeting in Sassari, and seminars at Cardiff

[33] For example, we know from past work (e.g., Alesina and Angeletos, 2005; Gee et al., 2017), that attitudes towards redistribution can depend on whether income is due to luck or effort.

University, IMT Lucca, University of Chieti-Pescara, Sophia University Institute, and University of Venice Ca' Foscari for valuable suggestions and discussions. We also thank the editor, Erik Snowberg, and two anonymous reviewers for valuable suggestions that improved our manuscript. Research support from the University of Venice Ca' Foscari VERA–LabEx and Masaryk University–MUEEL Lab are gratefully acknowledged. Financial support from the Czech Science Foundation (grant GA20-06785S) and the Social Sciences and Humanities Research Council of Canada (grant 435-5017-0573) is gratefully acknowledged. Cotton is grateful for additional financial support through his position as the Jarislowsky-Deutsch Chair in Economic & Financial Policy at Queen's. Eliane Barker provided invaluable research assistance. The experimental protocol was preregistered in OSF (https://doi.org/10.17605/OSF.IO/BRQVX) and received ethics approval from the GREB of Queen's University (GECO-018-20).

Appendix A. Proofs

Proposition 1. For any parameter values, there exists two types of equilibria: (1) a "no contribution" equilibrium in which $c_{j,n} = 0$ for all j, n, and (2) many "threshold provision" equilibria corresponding to every contribution profile in which for one good n, $C_n = \tau_n$ and $c_{j,n} \in [0, y_j]$ for each j, and where for all other goods $n' \neq n$, $C_{n'} = 0$.

Proof. (1) The no contribution equilibrium follows from the assumptions that $V > 1$. Thus, no player has an incentive to deviate from no contributions to unilaterally contribute $C_j > 0$ even if they could afford to unilaterally fund the good at the threshold. (2) Consider any contribution profile in which for some n, $C_n = \tau_n$ and $c_{j,n} \in [0, y_j]$ for each j, and where $c_{n'} = 0$ for all $n' \neq n$. Player j receives utility $V(y_j - c_{j,n}) + \tau_n + b_{j,n}$. If they deviate to $c' < c_{j,n}$, then they receive payoff $V(y_j - c')$, which achieves its maximum value at $c' = 0$. Player j has no incentive to make such a deviation as long as $V c_{j,n} < \tau_n + b_{j,n}$, which is assured for all $c_{j,n} \in [0, y_j]$ by the assumption that $y_j \leq B_{j,n}(\tau_n)/V$ for all j, n. Similarly, $V > 1$ ensures that there is no incentive to deviate to a higher $c_{j,n}$.

Showing that no other equilibria exists requires showing that neither (i) $C_n \in (0, \tau_n)$ nor (ii) $C_n > \tau_n$ is consistent with equilibrium. Let $C_{-j,n} = \sum_{i \neq j} c_{i,n}$. For (i), it is sufficient to note that any player contributing $c_{n,j} > 0$ when $C_n \in (0, \tau_n)$ prefers to deviate either to $c_{n,j} = 0$ when $\tau_n - C_{-j,n} > y_j$, or to $c_{n,j} = \tau_n = C_{-j,n}$ when $\tau_n - C_{-j,n} > y_j$. For (ii), it is sufficient to note that any player contributing $c_{n,j} > 0$ when $C_n > \tau_n$ has an incentive to reduce their contribution to $c_{j,n} = \max\{0, \tau_n - C{-}j, n\}$.

Corollary 1. Let $C_{-j,n} = \sum_{i \neq j} c_{i,n}$. If $C_{-j,n} \in [\tau_n - y_j, \tau_n)$, then agent j prefers contributing $c_{j,n} = \tau_n - C_{-j,n}$, ensuring that $C_n = \tau_n$, rather than any other $c_{j,n} \in [0, y_j]$.

Proof. The previous proof rules out deviation such that $C_n \in (0, \tau_n)$ or $C_n > \tau_n$. Therefore, it is sufficient to show that any j prefers $c_{j,n} = C_{-j,n} - \tau_n$ to $c_{j,n} = 0$. For such a j, contributing $c_{j,n} = C_{-j,n} - \tau_n$ results in payoff $V(y_j - c_{j,n}) + B_{j,n}$, while contributing $c_{j,n} = 0$ results in payoff $V y_j$. They prefer to contribute to achieve the threshold as long as $V c_{j,n} \leq B_{j,n}$, which is ensured $c_{j,n} \in [0, y_j]$ and the assumption that $y_j \leq B_{j,n}(\tau_n)/V$.

Appendix B. Additional tables and figures

Provided below.

Appendix C. Experimental instructions

[Instructions were originally written in Italian. The difference in the instructions between P&E_Diff and treatments with homogeneous endowments (Homogeneous and P_Diff) concerns the fact that, in the latter, all group members were endowed with 55 tokens. The difference in the instructions between P&E_Diff and treatments with homogeneous preferences (Homogeneous and E_Diff) concerns the fact that, in the latter, the bonus assigned to the selected public goods was equal to 30 points for all group members.]

Instructions

Welcome. Thanks for participating in this experiment. By following the instructions carefully, you can earn, based on your choices, an amount that will be paid to you in cash at the end of the experiment. During the experiment, it is not allowed to speak or communicate in any way with the other participants. If you have any questions, do not hesitate to contact the researcher through the chat. The following rules are the same for all participants.

General rules

At the beginning of the experiment, you will be assigned randomly and anonymously to a group of 4 people, respectively indicated with the letters A, B, C, and D. Of each of the other three members of your group, you will not know either the earnings. The composition of your group and the initial assignment of the letters will remain the same throughout the entire experiment. The experiment consists of 12 periods, in each of which you will interact exclusively with the subjects of your group. At the start of the experiment, you and every other subject in your group will be given one of four possible sets of tokens so that subject A will receive 34 tokens, B will receive 48 tokens, C will receive 62 tokens, and finally, D will receive 76 tokens. This means that, overall, your group will therefore have a total of 220 tokens in each period.

How earnings are determined in each period of the experiment?

Given your token allocation, you must decide how to divide it between an INDIVIDUAL ACCOUNT and eight COLLECTIVE ACCOUNTS called respectively "WHITE", "YELLOW", "GREEN", "RED", "BLUE", "PURPLE", "BLACK" and "ORANGE".

The nine ACCOUNTS generate a return expressed in points based on the following rules:

INDIVIDUAL ACCOUNT. You receive points from the INDIVIDUAL ACCOUNT every time you pour tokens into it. In particular, for each token you paid into the INDIVIDUAL ACCOUNT you will receive 2 points. "WHITE", "YELLOW", "GREEN", "RED", "BLUE", "PURPLE", "BLACK" and "ORANGE"

COLLECTIVE ACCOUNT. Receive points from a COLLECTIVE ACCOUNT if and only if the total number of tokens paid into it by the subjects of your group is greater than or equal to a "threshold" of 132 tokens.

In particular:

- If the number of tokens paid by your group into a COLLECTIVE ACCOUNT is below the threshold of 132 tokens, then you do not receive any points either from the tokens you paid or from those paid by your group to that COLLECTIVE ACCOUNT.
- If the number of tokens paid by your group into a COLLECTIVE ACCOUNT is greater than or equal to the 132 chip threshold, then for each token paid by you or any other person in your group into that COLLECTIVE ACCOUNT you receive 1 point; in addition, you are awarded a "bonus" in points whose size depends on the COLLECTIVE ACCOUNT to which the tokens were paid.

What is the size of the bonus?

In period 1, the computer will select four of the eight COLLECTIVE ACCOUNTS at random. The four COLLECTIVE ACCOUNTS selected by

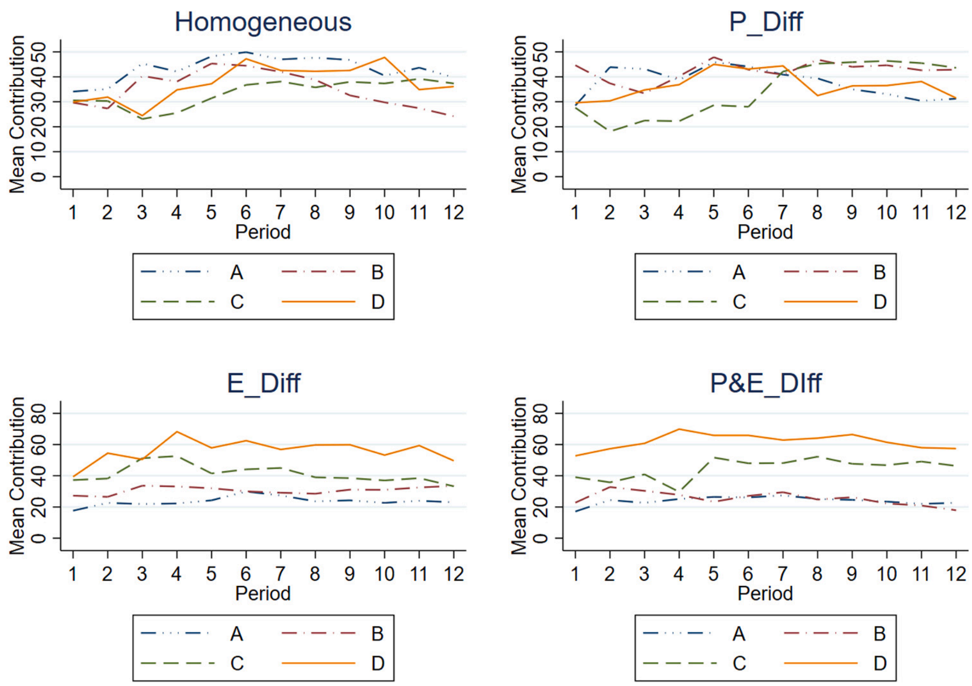

Fig. B.1. Total contributions in HC groups by subject-type in the four treatments.

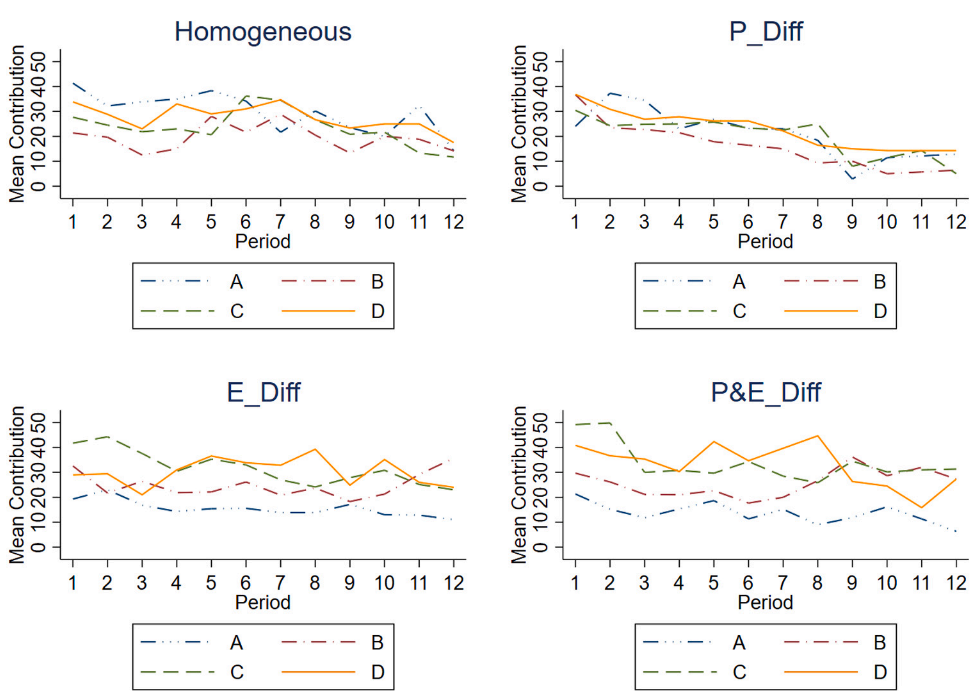

Fig. B.2. Total contributions in LC groups by subject-type in the four treatments.

Table B.2
Contributions and coordination on public goods: descriptive statistics in periods 1–3 and 10–12.

Period	*Homogeneous*		*P_Diff*		*E_Diff*		*P&E_Diff*	
	1–3	10–12	1–3	10–12	1–3	10–12	1–3	10–12
Coordination on Selected PGs	0.133	0.578	0.044	0.467	0.244	0.556	0.289	0.689
PG preferred by A	0.133	0.200	0.022	0.178	0.067	0.133	0.000	0.044
PG preferred by B	0.000	0.067	0.000	0.267	0.022	0.133	0.000	0.000
PG preferred by C	0.000	0.044	0.000	0.000	0.000	0.044	0.022	0.000
PG preferred by A, B, C	0.000	0.311	0.022	0.445	0.089	0.310	0.022	0.044
PG preferred by D	0.000	0.267	0.022	0.022	0.156	0.244	0.266	0.644
Coordination on Non-Selected PGs	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Obs. (per treatment)	45	45	45	45	45	45	45	45
Total Contribution	29.789	29.694	31.222	25.677	32.027	30.616	34.077	31.811
	(19.489)	(20.449)	(19.912)	(22.226)	(22.322)	(21.966)	(22.349)	(24.271)
Contribution to Selected PGs	28.017	29.022	29.000	25.483	30.333	30.472	32.877	31.611
	(19.516)	(20.773)	(19.905)	(22.127)	(21.935)	(22.037)	(22.610)	(24.285)
Contribution to Non-Selected PGs	1.772	0.672	2.222	0.194	1.694	0.144	1.200	0.200
	(8.057)	(5.005)	(8.950)	(1.701)	(6.375)	(1.094)	(4.639)	(2.683)
Obs. (per treatment)	180	180	180	180	180	180	180	180

Notes. This table replicates the analysis in Table 1 on periods 1–3 and 10–12. The other remarks on Table 1 apply.

Table B.3
Type-specific contributions to the selected public goods in *P&E_Diff* in periods 1–3 and 10–12.

P&E Diff								
Period	A		B		C		D	
	1–3	10–12	1–3	10–12	1–3	10–12	1–3	10–12
PG preferred by A	4.733	0.911	2.511	3.200	4.000	2.756	3.400	3.400
	(8.556)	(4.532)	(4.831)	(12.109)	(10.335)	(10.645)	(8.993)	(13.046)
PG preferred by B	0.200	0.000	6.489	0.177	0.933	0.000	2.844	0.000
	(0.944)	(0.000)	(10.350)	(1.193)	(2.378)	(0.000)	(7.769)	(0.000)
PG preferred by C	1.089	0.000	2.800	0.222	11.844	1.378	4.778	0.000
	(3.661)	(0.000)	(5.829)	(1.491)	(18.529)	(9.242)	(11.613)	(0.000)
PG preferred by D	12.466	17.222	14.177	19.533	23.044	36.644	36.200	41.000
	(12.793)	(14.931)	(16.611)	(19.262)	(24.598)	(24.476)	(29.562)	(30.332)
Obs.	45	45	45	45	45	45	45	45

Notes. This table replicates the analysis in Table 2 on periods 1–3 and 10–12. The other remarks on Table 2 apply.

Table B.4
Determinants of total contributions in *HC* groups in *E_Diff*, *P_Diff* and in *P&E_Diff*: parametric results in periods 1–3 and 10–12.

	E_Diff		*P_Diff*		*P&E_Diff*	
Total contribution	(1)	(2)	(3)	(4)	(5)	(6)
Period	1–3	10–12	1–3	10–12	1–3	10–12
Assigned Bonus			0.194	0.201***	0.598***	0.315***
			(0.191)	(0.047)	(0.108)	(0.078)
Endowment	0.681***	0.690***			0.776***	0.895***
	(0.178)	(0.163)			(0.122)	(0.170)
Constant	−2.417	−1.458	32.338***	34.109***	−12.931*	−20.637**
	(10.215)	(9.347)	(3.019)	(2.820)	(6.989)	(9.714)
ll	−419.355	−388.480	−411733	−339.213	−450.22	−395877
$Wald-\chi^2$	14.70	17.80	1.03	18.16	77.53	49.35
$p>\chi^2$	0.000	0.000	0.3101	0.000	0.000	0.000
Obs.	96	96	96	96	108	108
N. groups	8	8	8	8	9	9

Notes. This table replicates the analysis in Table 3 on periods 1–3 and 10–12. The other remarks on Table 3 apply.

Table B.5
Determinants of total contributions in *E_Diff*, *P_Diff*, and *P&E_Diff*: parametric results.

Total Contribution	*E_Diff*		*P_Diff*		*P&E_Diff*	
	(1)	(2)	(3)	(4)	(5)	(6)
Endowment	0.580***	0.590***			0.695***	0.717***
	(0.110)	(0.116)			(0.092)	(0.097)
Assigned bonus			0.314***	0.240***	0.486***	0.512***
			(0.050)	(0.068)	(0.041)	(0.054)
Last 6 periods		−1.046		−9.663***		−2.901
		(4.206)		(1.461)		(3.927)
Endowment × Last 6 Periods		−0.019				−0.066
		(0.074)				(0.068)
Assigned bonus × Last 6 Periods				0.300***		0.083
				(0.084)		(0.078)
Constant	0.256	0.779	26.192***	29.735***	−12.457**	−11.762**
	(6.451)	(6.785)	(2.396)	(2.236)	(5.368)	(5.655)
ll	−3064.23	−3062.52	−3066.76	−3045.58	−3001.99	−2990.89
$Wald-\chi^2$	28.050	31.480	38.720	86.370	207.250	235.720
$p>\chi^2$	0.000	0.000	0.000	0.000	0.000	0.000
Obs.	720	720	720	720	720	720
N. groups	15	15	15	15	15	15

Notes. This table replicates the analysis conducted in Table 3 by pooling data from HC and LC groups. The other remarks on Table 3 apply.

Table B.6
Determinants of total contributions in LC groups in *E_Diff*, *P_Diff*, and *P&E_Diff*: parametric results.

Total contribution	*E_Diff*		*P_Diff*		*P&E_Diff*	
	(1)	(2)	(3)	(4)	(5)	(6)
Assigned bonus			0.399***	0.111	0.616***	0.535***
			(0.159)	(0.074)	(0.113)	
Endowment	0.363**	0.358**			0.445***	0.522***
	(0.150)	(0.161)			(0.123)	(0.138)
Last 6 periods		−4.276		−14.127***		2.134
		(6.879)		(1.721)		(7.032)
Assigned bonus × Last 6 periods				0.590**		0.174
				(0.247)		(0.153)
Endowment × Last 6 periods		0.011				−0.152
		(0.120)				(0.122)
Constant	5.607	7.745	19.087***	26.244***	−3.291	−4.542
	(8.914)	(9.554)	(3.212)	(3.283)	(7.776)	(8.558)
ll	−1463.823	−1461.953	−1453.953	−1423.408	−1236.005	−1231.694
$Wald-\chi^2$	5.9	9.66	8.32	77.49	83.92	94.75
$p>\chi^2$	0.015	0.022	0.004	0.000	0.000	0.000
Obs.	336	336	336	336	288	288
N. groups	7	7	7	7	6	6

Notes. Notes. This table replicates the analysis conducted in Table 3 by using data from LC groups only. The other remarks on Table 3 apply.

Table B.7
Determinants of the contributions made to the funded public goods in HC groups in *E_Diff*, *P_Diff* and in *P&E_Diff*: parametric results.

Contribution to funded public goods	*E_Diff*		*P_Diff*		*P&E_Diff*	
	(1)	(2)	(3)	(4)	(5)	(6)
Endowment	0.659***	0.591***			0.538***	0.452***
	(0.122)	(0.139)			(0.116)	(0.120)
Assigned bonus			1.282***	1.284***	1.391***	1.447***
			(0.038)	(0.055)	(0.039)	(0.049)
Last 6 periods		−0.600		4.569**		−7.527*
		(7.668)		(2.024)		(3.853)
Endowment × Last 6 periods		0.136				0.194***
		(0.134)				(0.067)
Assigned bonus × Last 6 periods				−0.105		−0.177
				(0.084)		(0.109)
Constant	−6.188	−5.888	0.765	−0.272	−30.405***	−25.982***
	(6.981)	(7.965)	(1.583)	(1.641)	(6.622)	(6.846)
ll	−1730.88	−1725.11	−1491.24	−1488.33	−1663.16	−1657.79
$Wald-\chi^2$	29.100	40.820	1112.660	1135.890	1311.480	1356.660
$p>\chi^2$	0.000	0.000	0.000	0.000	0.000	0.000
Obs.	384	384	384	384	432	432
N. groups	8	8	8	8	9	9

Notes. This table replicates the analysis conducted in Table 3 by using the amount contributed by a subject in a HC group to the funded public good in the period as the dependent variable. The other remarks on Table 3 apply.

Table B.8
Determinants of the contributions made to the funded public goods in *LC* groups in *E_Diff*, *P_Diff* and in *P&E_Diff*: parametric results.

Contribution to funded public goods	*E_Diff*		*P_Diff*		*P&E_Diff*	
	(1)	(2)	(3)	(4)	(5)	(6)
Endowment	0.254***	0.231**			0.245***	0.250***
	(0.070)	(0.099)			(0.060)	(0.072)
Last 6 periods		−1.510		0.037		1.973
		(8.029)		(0.524)		(4.537)
Endowment × Last 6 periods		0.046				−0.012
		(0.140)				(0.079)
Assigned bonus			1.140***	1.097***	1.318***	1.362***
			(0.037)	(0.047)	(0.046)	(0.070)
Assigned bonus × Last 6 periods				0.110		−0.082
				(0.073)		(0.095)
Constant	−2.395	−1.639	0.045	0.025	−13.457***	−14.387***
	(4.519)	(6.044)	(0.337)	(0.430)	(3.462)	(4.137)
ll	−1491.163	−1491.005	−1002.513	−1001.301	−1095.420	−1094.913
$Wald-\chi^2$	13.04	13.37	967.17	976.31	844.31	848.28
$p>\chi^2$	0.000	0.004	0.000	0.000	0.000	0.000
Obs.	336	336	336	336	288	288
N. groups	7	7	7	7	6	6

Notes. This table replicates the analysis conducted in Table 3 by using the amount contributed by a subject in a *LC* group to the funded public good in the period as dependent variable. The other remarks on Table 3 apply.

Table B.9
Determinants of the contributions made to the funded public goods in *E_Diff*, *P_Diff* and in *P&E_Diff*: parametric results.

Contribution to funded public goods	*E_Diff*		*P_Diff*		*P&E_Diff*	
	(1)	(2)	(3)	(4)	(5)	(6)
Endowment	0.470***	0.423***			0.423***	0.372***
	(0.079)	(0.093)			(0.076)	(0.080)
Assigned bonus			1.266***	1.238***	1.363***	1.417***
			(0.027)	(0.038)	(0.030)	(0.040)
Last 6 periods		−1.025		1.266		−4.087
		(5.581)		(0.816)		(2.853)
Endowment × Last 6 periods		0.094				0.106**
		(0.098)				(0.050)
Assigned bonus × Last 6 periods				0.019		−0.120**
				(0.047)		(0.056)
Constant	−4.418	−3.906	0.484	0.003	−23.524***	−21.279***
	(5.161)	(5.867)	(0.828)	(0.883)	(4.343)	(4.567)
ll	−3241.41	−3237.32	−2622.70	−2620.19	−2769.91	−2765.90
$Wald-\chi^2$	35.250	43.480	2238.860	2259.220	2173.860	2206.630
$p>\chi^2$	0.000	0.000	0.000	0.000	0.000	0.000
Obs.	720	720	720	720	720	720
N. groups	15	15	15	15	15	15

Notes. This table replicates the analysis presented in Table B.7 pooling data from *HC* and *LC* groups. The other remarks of Table 3 apply.

the computer will be called "SELECTED", while the remaining four will be called "NOT SELECTED". The bonus awarded to each person in the group by the four "NOT SELECTED" COLLECTIVE ACCOUNTS will be equal to 20 points. The bonus recognized by a "SELECTED" COLLECTIVE ACCOUNT depends on whether the subject considers that COLLECTIVE ACCOUNT as "FAVORITE" or "NOT FAVORITE": if for the subject that COLLECTIVE ACCOUNT is "FAVORITE", then the bonus awarded to the subject is of 39 points; if instead for the subject that COLLECTIVE ACCOUNT is "NOT FAVORITE", then the bonus awarded to the subject is 27 points. At the beginning of the first period, the computer will assign each participant a "FAVORITE" COLLECTIVE ACCOUNT from the four "SELECTED" so that each "SELECTED" COLLECTIVE ACCOUNT is preferred by only one person in the group.

How do you make your choices?

- The computer will show you your token allocation and nine fields where you can enter your choices, one for the INDIVIDUAL ACCOUNT and one for each of the eight COLLECTIVE ACCOUNTS.
- In each of the eight fields, the computer will also show you the size of the bonus, 20, 27 or 39 points, awarded in the period to that COLLECTIVE ACCOUNT.
- A table will also show you which COLLECTIVE ACCOUNTS are PREFERRED by the other parties in the group and their token allocations.
- For each member of your group, the order in which the fields of the eight COLLECTIVE ACCOUNTS will appear on the screen will be determined randomly by the computer.
- The sum of the payments made by you in the nine ACCOUNTS must always be equal to your endowment of tokens; this means that in each period, you will have to use the full amount of tokens at your disposal.

At the end of each period, the computer will show you how many tokens you have paid into the INDIVIDUAL ACCOUNT, how many tokens you have paid into each of the eight COLLECTIVE ACCOUNTS, how many tokens your group has paid into each of the eight COLLECTIVE ACCOUNTS, how many points you have obtained from the ACCOUNT INDIVIDUAL, how many points you have obtained from each of the eight COLLECTIVE ACCOUNTS and how many points you have gained in the period. At the end of the experiment, the points gained over the 12 periods will be converted into Euros at the exchange rate of 150 points = 1 EUR (see Fig. C.1).

Table B.10
Contributions of the subject-types in the four treatments: parametric results.

Total contribution	*Homogeneous*		*P_Diff*		*E_Diff*		*P&E_Diff*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
B	−9.106**	−10.250*	0.089	−4.952	8.194*	9.476	5.778	12.138**
	(3.912)	(6.137)	(4.221)	(5.378)	(5.983)	(6.667)	(4.120)	(5.555)
C	−8.306**	−6.194	−2.078	−0.797	17.011***	16.178**	20.467***	20.138***
	(3.912)	(6.137)	(4.221)	(5.378)	(5.983)	(6.667)	(4.120)	(5.555)
D	−4.294	−2.166	0.172	1.809	24.139***	14.738**	30.622***	19.583***
	(3.912)	(6.137)	(4.221)	(5.378)	(5.983)	(6.667)	(4.120)	(5.555)
HC		13.606**		17.068***		8.102		10.300*
		(3.823)		(6.169)		(6.521)		(6.077)
B × HC		1.907		9.452		−2.403		−10.601
		(7.924)		(8.192)		(9.130)		(7.171)
C × HC		−3.518		−2.400		1.561		0.546
		(7.924)		(8.192)		(9.130)		(7.171)
D × HC		0.354		−3.069		17.626*		18.398**
		(7.924)		(8.192)		(9.130)		(7.171)
Constant	37.900***	29.736***	29.889***	20.785***	19.833***	15.511***	19.806***	13.625***
	(3.260)	(4.502)	(3.912)	(4.505)	(3.758)	(4.762)	(3.613)	(4.707)
ll	−3047.93	−3042.43	−3084.70	−3076.35	−3064.21	−3056.61	−3063.02	−3052.42
$Wald-\chi^2$	6.870	30.420	22.49	27.820	28.130	51.25	68.530	119.79
$p>\chi^2$	0.076	0.000	0.941	0.000	0.000	0.000	0.000	0.000
Obs.	720	720	720	720	720	720	720	720
N. groups	15	15	15	15	15	15	15	15

Notes. This table reports coefficient estimates (standard errors in parentheses) from two-way linear random effects models accounting for both potential individual dependency over periods and dependency within the group. The dependent variable is the total contribution made by the subject to the eight collective accounts in the period. *B*, *C*, and *D* are subject-types dummies. *HC* is a dummy that takes a value of 1 if the subject belongs to a *HC* group and 0 o/w. *B × HC*, *C × HC*, and *D × HC* are interaction terms. Significance levels are denoted as follows: * $p<0.1$, **$p<0.05$, and *** $p<0.01$.

Table B.11
Profits of the subject-types in *P&E_Diff* and *E_Diff*: parametric results in periods 1–3 and 10–12.

	P&E_Diff		*E_Diff*	
Profit	(1)	(2)	(3)	(4)
Period	1–3	10–12	1–3	10–12
B	8.889	−9.444	13.619	−4.857
	(20.719)	(17.600)	(22.654)	(19.723)
C	2.889	15.556	13.048	27.905
	(20.719)	(17.600)	(22.654)	(19.723)
D	42.333**	62.778***	70.476***	51.810***
	(20.719)	(17.600)	(22.654)	(19.723)
HC	30.389	76.981***	43.310	53.375*
	(31.629)	(24.227)	(27.129)	(29.158)
B × HC	4.667	42.185*	−2.452	14.607
	(26.748)	(22.721)	(31.021)	(27.007)
C × HC	18.741	−8.963	−0.131	2.012
	(26.748)	(22.721)	(31.021)	(27.007)
D × HC	−25.000	−40.185*	−41.310	−29.560
	(26.748)	(22.721)	(31.021)	(27.007)
Constant	66.278***	112.278***	53.190***	105.000***
	(24.500)	(18.766)	(19.812)	(21.294)
ll	−1014.514	−982.936	−1037.226	−1017.591
$Wald-\chi^2$	8.41	40.78	16.27	18.18
$p>\chi^2$	0.297	0.000	0.022	0.011
Observations	180	180	180	180
Number of groups	15	15	15	15

Notes. This table replicates the analysis in Table 4 on periods 1–3 and 10–12. The other remarks on Table 4 apply.

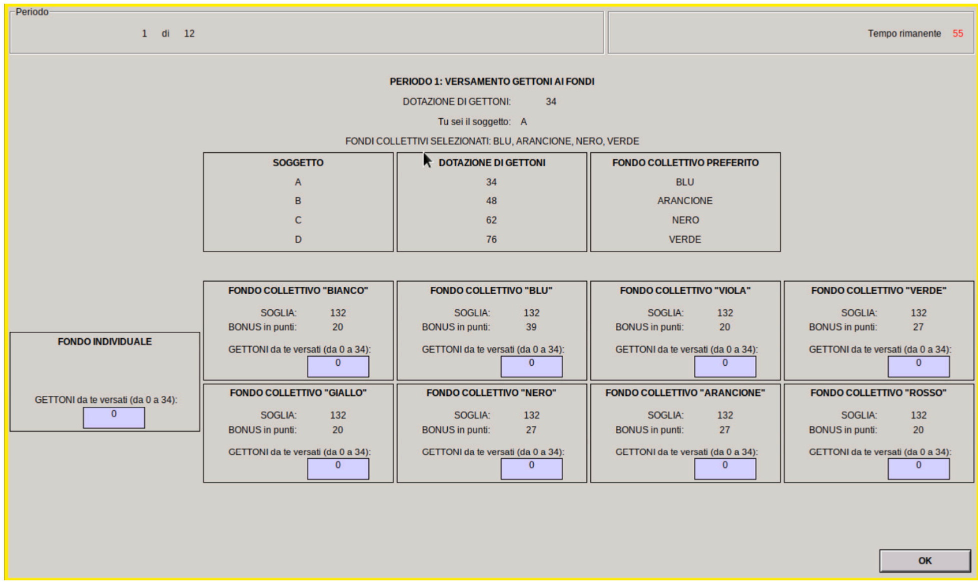

Fig. C.1. Choice Screen in *P&E_Diff*.

References

Agranov, M., Palfrey, T.R., 2015. Equilibrium tax rates and income redistribution: A laboratory study. J. Public Econ. 130, 45–58.

Aldashev, G., Marini, M., Verdier, T., 2020. Samaritan bundles: Fundraising competition and inefficient clustering in NGO projects. Econ. J. 130 (630), 1541–1582.

Alesina, A., Angeletos, G.M., 2005. Fairness and redistribution. Amer. Econ. Rev. 95, 960–980.

Andreoni, J., 1998. Toward a theory of charitable fund-raising. J. Polit. Econ. 106 (6), 1186–1213.

Andrews, E., Bartczak, L., Brest, P., Shamash, R., Tantia, P., 2020. Community-Based Organizations and High-Capacity Donors: Relationships, Perceptions, and Behaviors. Center on Philanthropy and Civil Society, Stanford PACS.

Argo, N., Klinowski, D., Krisknamurti, T., Smith, S., 2020. The completion effect in charitable crowdfunding. J. Econ. Behav. Organ. 172, 17–32.

Bagnoli, M., McKee, M., 1991. Voluntary contribution games: Efficient private provision of public goods. Econ. Inq. 29 (2), 351–366.

Bardsley, N., Mehta, J., Starmer, C., Sugden, R., 2010. Explaining focal points: Cognitive heirarchy theory versus team reasoning. Econ. J. 120, 40–79.

Bauer, R.A., Dexter, L.A., de Sola Pool, I., 2007. American Business and Public Policy: The Politics of Foreign Trade, second ed. Atherton, New York.

Baumgartner, F.R., Berry, J.M., Hojnacki, M., Kimball, D.C., Leech, B.L., 2009. Lobbying and Policy Change: Who Wins, Who Loses, and Why. The University of Chicago Press.

Becchetti, L., Pelligra, V., Reggiani, T., 2017. Information, belief elicitation and threshold effects in the 5X1000 tax scheme: A framed field experiment. Int. Tax Public Finance 24 (6), 1026–1049.

Birn, A.-E., 2014. Philanthrocapitalism, past and present: The rockefeller foundation, the gates foundation, and the setting(s) of the international/global health agenda. Hypothesis 12 (1), e8.

Blinder, A.S., Morgan, J., 2005. Are two heads better than one? Monetary policy by committee. J. Money Credit Bank. 37, 789–811.

Blinder, A.S., Morgan, J., 2008. Leadership in groups: A monetary policy experiment. Int. J. Central Bank. 4, 117–150.

Brekke, K.A., Konow, J., Nyborg, K., 2017. Framing in a threshold public goods experiment with heterogeneous endowments. J. Econ. Behav. Organ. 138, 99–110.

Buso, I.M., De Caprariis, S., Di Cagno, D., Ferrari, L., Larocca, V., Marazzi, F., Panaccione, L., Spadoni, L., 2020. The effects of COVID-19 lockdown on fairness and cooperation: Evidence from a lablike experiment. Econom. Lett. 196, 109577.

Cabrales, A., Nagel, R., Rodriguez-Mora, J.V., 2012. It is hobbes, not rousseau: An experiment on voting and redistribution. Exp. Econ. 15, 278–308.

Cason, T.N., Tabarrok, A., Zubrickas, R., 2021. Early refund bonuses increase successful crowdfunding. Games Econom. Behav. 129, 78–95.

Cason, T.N., Zubrickas, R., 2019. Donation-based crowdfunding with refund bonuses. Eur. Econ. Rev. 119, 452–471.

Chan, K.S., Mestelman, S., Moir, R., Muller, R.A., 1999. Heterogeneity and the voluntary provision of public goods. Exp. Econ. 2 (1), 5–30.

Cherry, T.L., Kroll, S., Shogren, J.F., 2005. The impact of endowment heterogeneity and origin on public good contributions: Evidence from the lab. J. Econ. Behav. Organ. 57 (3), 357–365.

Coate, S., 2004. Pareto-improving campaign finance policy. Amer. Econ. Rev. 94, 628–655.

Corazzini, L., Cotton, C., Reggiani, T., 2019. Delegation and coordination with multiple threshold public goods: Experimental evidence. Exp. Econ. 23, 1030—-1068.

Corazzini, L., Cotton, C., Valbonesi, P., 2015. Donor coordination in project funding: Evidence from a threshold public goods experiment. J. Public Econ. 128, 16–29.

Cotton, C., 2009. Should we tax or cap political contributions? A lobbying model with policy favors and access. J. Public Econ. 93, 831–842.

Cotton, C., 2012. Pay-to-play politics: Informational lobbying and campaign finance reform when contributions buy access. J. Public Econ. 96, 369–386.

Crawford, V.P., Gneezy, U., Rottenstreich, Y., 2008. The power of focal points is limited: Even minute payoff asymmetry may yield large coordination failures. Amer. Econ. Rev. 98, 1443–1458.

Deryugina, T., Marx, B.M., 2021. Is the supply of charitable donations fixed? Evidence from deadly tornadoes. Am. Econ. Rev. Insights 3, 383–398.

Devetag, G., Ortmann, A., 2007. When and why? A critical survey on coordination failure in the laboratory. Exp. Econ. 10, 331–344.

Duch, M.L., Grossmann, M.R., Lauer, T., 2020. Z-tree unleashed: A novel client-integrating architecture for conducting z-Tree experiments over the internet. J. Behav. Exp. Finance 28, 100400.

Duffy, J., 2016. Macroeconomics: A survey of laboratory research. In: The Handbook of Experimental Economics, vol. 2. pp. 1–90.

Duquette, N.J., Hargaden, E.P., 2021. Inequality and giving. J. Econ. Behav. Organ. 186, 189–200.

Exley, C.L., Kessler, J.B., 2024. Equity concerns are narrowly framed. Am. Econ. J. Microecon. 16, 147–179.

Faubion, T., Paige, S.B., Pearson, A.L., 2011. Co-opting the global health agenda: The problematic role of partnerships and foundations. In: Rushton, S., Williams, O.D. (Eds.), Partnerships and Foundations in Global Health Governance. Palgrave Macmillan, pp. 209–227.

Feige, C., Ehrhard, K.-M., Kramer, J., 2018. Climate negotiations in the lab: A threshold public goods game with heterogeneous contributions costs and non-binding voting. Environ. Resour. Econ. 70, 343–362.

Feldstein, M., 1976. On the theory of tax reform. J. Public Econ. 6, 77–104.

Filiz-Ozbay, E., Uler, N., 2019. Demand for giving to multiple charities: An experimental study. J. Eur. Econ. Assoc. 17, 725–753.

Fiske, S.T., 2010. Interpersonal stratification: Status, power, and subordination. In: Fiske, S.T., Gilbert, D.T., Lindzey, G. (Eds.), Handbook of Social Psychology. John Wiley and Sons, pp. 941–982.

Foerster, M., van der Weele, J.J., 2021. Casting doubt: Image concerns and the communication of social impact. Econ. J. 131 (639), 2887–2919.

Francia, P., Green, J., Herrnson, P., Powell, L., Wilcox, C., 2003. The Financiers of Congressional Elections: Investors, Ideologues, and Intimates. Columbia University Press.

Frohlich, N., Oppenheimer, J.A., 1990. Choosing justice in experimental democracies with production. Am. Political Sci. Rev. 84, 461–477.

Gee, L.K., Migueis, M., Parsa, S., 2017. Redistributive choices and increasing income inequality: Experimental evidence for income as a signal of deservingness. Exp. Econ. 20, 894–923.

Gimpel, J.G., Lee, F.E., Pearson-Merkowitz, S., 2008. The check is in the mail: Interdistrict funding flows in congressional elections. Am. J. Political Sci. 52, 373–394.

Goss, K.A., 2016. Policy plutocrats: How America's wealthy seek to influence governance. PS: Politcal Sci. Politics 49, 442–448.
Granovetter, M., 1978. Threshold models of collective behavior. Am. J. Sociol. 83, 1420–1443.
Greiner, B., 2015. Subject pool recruitment procedures: organizing experiments with ORSEE. J. Econ. Sci. Assoc. 1 (1), 114–125.
Grober, J., Reuben, E., 2013. Redistribution and market efficiency: An experimental study. J. Public Econ. 101, 39–52.
Grossman, G.M., Helpman, E., 1994. Protection for sale. Amer. Econ. Rev. 84, 833–850.
Gulzar, S., Rueda, M.R., Ruiz, N.A., 2021. Do campaign contribution limites curb the influence of money in politics? Am. J. Political Sci. Forthcoming.
Hall, R.L., Deardorff, A.V., 2006. Lobbying as legislative subsidy. Am. J. Political Sci. 100, 69–84.
Harsanyi, J., Selten, R., 1988. A General Theory of Equilibrium Selection in Games. MIT University Press, Cambridge, MA.
Hartley, K., Sandler, T., 1999. NATO burden-sharing: Past and future. J. Peace Res. 36, 665–680.
Heckathorn, D.D., 1996. The dynamics and dilemmas of collective action. Am. Sociol. Rev. 61, 250–277.
Hirshleifer, J., 1983. From weakest-link to best-shot: The voluntary provision of public goods. Public Choice 41, 371–386.
Hudik, M., Chovanculiak, R., 2018. Private provision of public goods via crowdfunding. J. Inst. Econ. 14, 23–44.
Hummel, C., Gerring, J., Burt, T., 2021. Do political finance reforms reduce corruption? Br. J. Political Sci. 51, 869–889.
Ito, T., Krueger, A.O. (Eds.), 1992. Political economy of tax reform. In: NBER East Asia Seminar on Economics, vol. 1, National Bureau of Economic Research.
Jiménez-Jiménez, N., Molis, E., Solano-Garćia, Á., 2020. The effect of initial inequality on meritocracy: A voting experiment on tax redistribution. J. Public Econ. 175, 380–394.
Kessler, J.B., Milkman, K.L., Zhang, C.Y., 2019. Getting the rich and powerful to give. Manage. Sci. 65, 4049–4062.
Kittel, B., Kanitsar, G., Traub, S., 2017. Knowledge, power, and self-interest. J. Public Econ. 150, 39–52.
Konrath, S., Clark, V.B., 2020. For good or for ego? Changing motivations for philanthropy and their impact on funding. Stanf. Soc. Innov. Rev. Online Webinar.
Krugman, P., 2020-07-01. Why do the rich have so much power? N.Y. Times.
Lessig, L., 2011. Republic, Lost: How Money Corrupts Congress and a Plan to Stop It. Twelve Books, New York.
Lindahl, E., 1919. Just taxation: A positive solution. In: Richard, A., Peacock, A. (Eds.), Classics in the Theory of Public Finance.
Mancur Olson, J., 1965. The Logic of Collective Action. Harvard University Press.
Marks, M.B., Croson, R.T., 1999. The effect of incomplete information in a threshold public goods experiment. Public Choice 99 (1), 103–118.
Marquis, C., Davis, G.F., Glynn, M.A., 2013. Golfing alone? Corporations, elites, and nonprofit growth in 100 American communities. Organ. Sci. 24, 39–57.
Martens, J., Seitz, K., 2015. Philanthropic Power and Development: Who Shapes the Agenda?. Global Policy Forum.
Marwell, G., Oliver, P., 1979. Experiments on the provision of public goods. I. Resources, interest, group size, and the free-rider problem. Am. J. Sociol. 84, 1335–1360.
Marwell, G., Oliver, P.E., Prahl, R., 1988. Social networks and collective action: A theory of the critical mass III. Am. J. Sociol. 94 (3), 502–534.
Mattan, B.D., Cloutier, J., 2020. A registered report on how implicit pro-rich bias is shaped by the perceiver's gender and socioeconomic status. R. Soc. Open Sci. 7, 191232.
Maurice, J., Rouaix, A., Willinger, M., 2013. Income redistribution and public good provision: An experiment. Internat. Econom. Rev. 54 (3), 957–975.
McCoy, D., McGoey, L., 2011. Global health and the gates foundation - in perspective. In: Rushton, S., Williams, O.D. (Eds.), Partnerships and Foundations in Global Health Governance. Palgrave Macmillan, pp. 143–163.
Meer, J., 2017. Does fundraising create new giving? J. Public Econ. 145, 82–93.
Mehta, J., Starmer, C., Sugden, R., 1994. The nature of salience: An experimental investigation of pure coordination games. Amer. Econ. Rev. 84, 658–673.
Mirrlees, J.A., 1971. An exploration in the theory of optimal income taxation. Rev. Econ. Stud. 38, 175–208.
Murdoch, J.C., Sandler, T., 1984. Complementarity, free riding, and the military expenditures of NATO allies. J. Public Econ. 25, 83–101.
Musgrave, R.A., 1959. The Theory of Public Finance. McGraw-Hill, New York.
Nownes, A., Neeley, G., 1996. Toward an explanation for public interest group formation and proliferation: Seed money, disturbances, entrepreneurship, and patronage. Policy Stud. J. 24 (1), 74–92.
Offerman, T., Potters, J., Verbon, H.A., 2001. Cooperation in an overlapping generations experiment. Games Econom. Behav. 36, 264–275.
Oliver, P.E., Marwell, G., Teixeira, R., 1985. A theory of of the critical mass I. Interdependence, group heterogeneity, and the production of collective action. Am. J. Sociol. 91 (3), 522–556.
Orbinski, J., 2009. An Imperfect Offering: Humanitarian Action in the Twenty-First Century. Doubleday Canada.
Page, B.I., Seawright, J., Lacombe, M.J., 2019. Billionaires and Stealth Politics. University of Chicago Press.
Perroni, C., Pogrebna, G., Sandford, S., Scharf, K., 2019. Are donors afraid of core costs? Economies of scale and contestability in charity markets. Econ. J. 129 (622), 2608–2636.
Petruzzelli, A.M., Natalicchio, A., Panniello, U., Romo, P., 2019. Understanding the crowdfunding phenomenon and its implications for sustainability. Technol. Forecast. Soc. Change 141, 138–148.
Prat, A., 2002. Campaign spending with office-seeking politicians, rational voters, and multiple lobbies. J. Econom. Theory 103, 162–189.
Rahman, M.S., Giessen, L., 2017. Formal and informal interests of donors to allocate aid: Spending patterns of USAID, GIZ, and EU forest development policy in Bangladesh. World Dev. 94, 250–267.
Rapoport, A., Suleiman, R., 1993. Incremental contribution in step level public goods games with asymmetric players. Organ. Behav. Hum. Decis. Process. 55, 171–194.
Ray, D., Baland, J.-M., Dagnelie, O., 2007. Inequality and inefficiency in joint projects. Econ. J. 117, 922–935.
Riedl, A., van Winden, F., 2001. Does the wage tax system cause budget deficits? A macro-economic experiment. Public Choice 109, 371–394.
Riedl, A., van Winden, F., 2007. An experimental investigation of wage taxation and unemployment in closed and open economies. Eur. Econ. Rev. 51, 871–900.
Rushton, S., Williams, O.D. (Eds.), 2011. Partnerships and Foundations in Global Health Governance. Palgrave Macmillan.
Saez, E., 2011. Using elasticities to derive optimal income tax rates. Rev. Econ. Stud. 68, 205–229.
Sandler, T., 1992. Collective Action: Theory and Applications. University of Michigan Press.
Sandler, T., 1998. Global and regional public goods: A prognosis for collective action. Fiscal Studies 19, 221–247.
Sandler, T., Forbes, J.F., 1980. Burden sharing, strategy, and the design of NATO. Econ. Inq. 18, 425–444.
Sausgruber, R., Tyran, J.-R., 2011. Are we taxing ourselves? How deliberation and experience shape voting on taxes. J. Public Econ. 95, 164–176.
Schelling, T., 1960. The Strategy of Conflict. Harvard University Press, Cambridge, MA.
Schmitz, J., 2021. Is charitable giving a zero-sum game? The effect of competition between charities on giving behavior. Manage. Sci. 67, 5969–6627.
Sheremeta, R.M., Uler, N., 2021. The impact of taxes and wasteful government spending on giving. Exp. Econ. 24 (2), 355–386.
Smith, A., 1776. An Inquiry into the Nature and Causes of the Wealth of Nations. W. Strahan and T. Cadell, London.
Smith, S., Windmeijer, F., Wright, E., 2015. Peer effects in charitable giving: Evidence from the (running) field. Econ. J. 125 (585), 1053–1071.
Steuerle, C.E., Bourne, J., Ovalle, J., Raub, B., Newcomb, J., Steele, E., 2018. Patterns of Giving by the Wealthy. Urban Institute.
Stratmann, T., 2005. Some talk: Money in politics. A (partial) review of the literature. Public Choice 124, 135–156.
Uler, N., 2011. Public goods provision, inequality and taxes. Exp. Econ. 14 (3), 287–306.
van der Heijden, E.C., Nelissen, J.H., Potters, J.J., Verbon, H.A., 1998. Transfers and the effect of monitoring in an overlapping-generations experiment. Eur. Econ. Rev. 42, 1363–1391.
Weinzierl, M., 2017. Popular acceptance of inequality due to innate brute luck and support for classical benefit-based taxation. J. Public Econ. 155, 54–63.
Weinzierl, M., 2018. Revisiting the classical view of benefit-based taxation. Econom. J. 128, F37–F64.