A Simple Twist of Fate

A Social Dilemma Experiment on Democratic Institutions and Cooperation

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Abstract

In this paper we study electoral systems in an experimental governance game in which citizens contribute to a public good and policymakers decide how to distribute it. In the *Voting* condition, citizens receive information about the policymaker performance (how much she shared of the public good with individual participants), her skills and her altruism, and vote directly for a policymaker for the next election cycle. In the *Referendum* condition voters receive information about the policymaker's performance before deciding whether to remove her from office in a simpler binary choice (in or out). If they decide to remove the incumbent, a new policymaker is chosen randomly from the remaining group members, in the spirit of referendums like Brexit or the plebiscite about the peace agreements in Colombia. We compare these two electoral mechanisms with two baselines in which the policymaker is never replaced (*Baseline*) and another one (*Random*) in which the policymaker is always randomly replaced by another participant. Our results show that both electoral mechanisms are largely effective in improving citizens' welfare by generating more equitable sharing rules. Citizens in *Voting* and *Referendum* extract greater surplus from policymakers, and that voting against a candidate (*Referendum*) is more effective in increasing surplus than voting for a candidate (*Voting*). Contributions to the public good and conditional cooperation patterns remain strikingly similar in democratic (*Referendum* and *Voting*) and non-democratic (*Baseline* and *Random*) conditions. We show that policymakers condition the distribution of the public good differently in democratic and non-democratic settings. That is, democratic institutions are effective in improving citizens' welfare by indirectly limiting policymakers' surplus.

Keywords: political uncertainty, referendums, public goods provision, experimental social dilemmas

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1. Introduction

The strength of a democracy lies in the ability of its institutions to promote social welfare. Democracies play a crucial role in fostering cooperation by moving individuals to adhere to fair rules (Gallier, 2020; Bardhan, 2010), curbing tax evasion (Frey, 1998), or enhancing productivity (Tyson, 1990; Bonin et al., 1993; Black & Lynch, 2001). In this paper we define democratic institutions by a distinguishable feature of democratic governance: **voting rights** i.e., how citizens make a collective decision to either elect or remove the policymaker in office (following Diamond 2016). In a democratic election, every citizen has a vote that accounts for determining the next policymaker in charge. According to Morlino & Diamond (2004) there are eight dimensions on which democracies vary in quality: freedom, the rule of law, vertical accountability, responsiveness, equality, participation, competition, and horizontal accountability. Nonetheless, out of those, voting is fundamental to our definition because even where there could be unequal, irresponsive, and unaccountable democracies, there is no democracy without voting rights.

Our research question is two-fold. We are firstly, interested in the extent to which voting rights affect the patterns of conditional cooperation in citizens and policymakers. Therefore, we are to compare two voting-based political arrangements, *Voting* (for a candidate) *and Referendum* (against a ruler), with two institutional environments in which there are not voting rights: *Baseline* (one policymaker exogenously chosen for all rounds), and *Random* (one policymaker randomly chosen each round). Second, we wish to examine how voting for a candidate (*Voting treatment)* instead of against one (*Referendum treatment)* shape the policymakers' rent-seeking behavior.

In a series of laboratory experiments, we compare electoral competition with a simpler alternative: referenda. We define referenda as a political situation in which a democratic regime is to choose between a ruler or a political system from a certain status quo and an uncertain alternative (as in the 1946 Italian Referendum between Monarchy and Republic). Both electoral competition and referenda rely on citizens' participatory rights, and the outcome of elections and referenda is still determined by votes. However, while the number and singularity of alternative candidates make voters' decisions more complex in an election than in a referendum, the outcome uncertainty of the latter makes the decision-making process more vulnerable to behavioral biases (Borges & Clarke, 2008).

Inspired by Christensen (2021) we define outcome uncertainty as the voter's inability to predict the chances for a *good* policymaker (or political system) to take power i.e., to anticipate the outcome of a consultation. Crucial in our research question, the outcome of the referendum is many times uncertain, as voters choose between a well-known status quo and an uncertain and loosely defined alternative. Recent political processes, from Brexit referendum to the Colombian peace agreement plebiscite (Marsh, 2017) provide excellent examples of this uncertainty, causing governments to fall (in the UK) or tremble (in Colombia).

Referenda have been widely studied using observational data in political science (Morisi et al., 2021). To the best of our knowledge, there remains a significant gap in behavioral studies comparing electoral systems with different levels of outcome uncertainty (Battaglini et al, 2010 is a notable exception). Outcome uncertainty might increase when facing long time horizons (Jacobs and Matthews, 2012), or conflictive outcome predictions (Jerit, 2009). We, however, do not study the origins of outcome uncertainty, but its impact on citizens' and policymakers' behavior. In this paper we study electoral systems using a variant of the public goods game: the governance game (like the one used in Hamman, Weber, and Woon, 2011). In the governance game, citizens and rulers have different roles. Citizens contribute to a productive activity (a public good) and elect or dismiss rulers. Rulers (or policymakers, as we label them in this paper) are entitled to distribute the public good to citizens, themselves included.

Voting is a low-uncertainty condition as citizens have information about candidates' skills, pro-sociality, and past performance, and actively manipulate the odds by selecting who they want to rule in the next election cycle. We compare *Voting* with an institution where replacing the incumbent creates uncertainty. In the *Referendum* condition, citizens make a simpler decision on whether to keep the incumbent or kick her out. If dismissed, the new ruler is selected at random. Even when the decision process is informed, the outcome is more uncertain. Citizens are aware of the incumbent's past performance, for which they develop informed preferences regarding the policymaker, but have no clue about their pro-sociality or their skills. Besides, they have no say in who will be chosen next. The random selection of a replacement (if the incumbent is dismissed) limits citizen's pivotality and makes the outcome of the referendum more uncertain and unpredictable.

Unlike real-life electoral systems, citizens in our *Voting* and *Referendum* conditions demonstrate elevated levels of pivotality. This heightened influence results from the

experimental group size (four), offering greater potential to sway consultation outcomes. However, the nature of this influence differs between treatments; in the Voting condition, citizens vote for a candidate, while in the *Referendum's*, they cast votes against the incumbent. In the latter condition, citizens will harbor a nuanced belief in their ability to influence the election of the subsequent policymaker, reflecting a subtle sense of pivotality (Duffy & Tavits, 2008).

We compare these two conditions with two baselines in which the policymaker is never replaced (*Baseline*) and another one (*Random*) in which the policymaker is randomly replaced by another participant in every election round. Following Christensen (2022) and Tomz and Van Houweling (2009) we are interested in learning whether *Referendum* uncertainty is tolerated by voters or exploited by policymakers, as the binary character of referenda may deepen citizens' polarization and push politicians to grant anything in their capacity to retain power (Martinico, 2019).

As the assignment of participants to conditions is random (as discussed in the next section), our paper can make causal claims on the role played by incentives and behavioral drivers. A crucial difference between our democratic (*Voting* and *Referendum*) and non-democratic conditions (*Random* and *Baseline*) is that differences in governance institutions alter incentives to act by policymakers (Doyle 1986, Levy and Razin 2004). If rulers anticipate that their performance will be assessed by voters (either in elections or in a revocatory referendum), they may adjust their behavior to make their reelection more likely or their dismissal less probable. Despite the challenge of linking performance with voting (de Vries and Giger, 2014; Stiers, 2019), retrospective evaluations of candidates shape policies and mitigate election problems (Francis et al, 1994).

The other causal mechanism relies on whether different governance arrangements trigger different preferences or behavioral norms (Bowles and Polanía-Reyes, 2012, Rosato, 2003). Participatory institutions may promote more cooperative individuals, in line with Kant's argument that democracies promote economic cooperation through mutual advantage (Sørensen, 1992). We test this possibility closely examining how cooperation patterns are shaped by democratic institutions (*Voting* and *Referendum*) relative to non-democratic ones (*Baseline* and *Random*). We run this test in four different ways: (1) examining how citizens condition their contributions to the contributions of other citizens, (2) how citizens reciprocate the distributional decisions made by policymakers, (3) how policymakers react to contribution decisions made by citizens, and (4) differences between citizens and

policymakers' outcomes across conditions. In other words, we test if different governance arrangements change either the preferences individuals use to decide or whether democratic institutions push individuals away from individual rationality principles into some form of team reasoning of social welfare maximizing behavior.

We use laboratory experiments to answer our research questions. Given the very limited number of natural experiments addressing the connection between cooperation, distribution, uncertainty, and political institutions, laboratory experiments have some methodology advantages: only experiments can measure governance treatment effects in a causal manner. Our experimental model captures some key features of governance arrangements, excluding many other relevant factors that make our research question tractable. We do not directly test the external validity of our approach in this paper. Unless a regularity can be identified in a lab, we argue that scientists (not only economists) should be legitimately cautious about the same phenomenon working outside the laboratory.

To create our experimental framework, we build our design from a well-established social dilemma setting widely used in experimental economics: public goods games (Ledyard, 1995; Gangadharan et al., 2015; Erkal et al., 2011; Hamman, Weber, and Woon, 2011). Social dilemmas have proved to be useful experimental models to study cooperation in different settings, including the provision of global public goods (Buchan et al, 2009, 2011, 2012), large scale social dilemmas (Bicchieri et al, 2021), within group cooperation when group members differ in roles and capacities (Fallucchi et al, 2021, Fatas et al, 2010, 2020, Eckel et al, 2010), or between group cooperation (Eckel et al, 2022, Restrepo-Plaza et al, 2022, 2023).

Extensive literature exists on policy mechanisms that employ laboratory experiments to constrain policymaker behavior (for an overview, see Abbink and Serra, 2012; Banuri and Eckel, 2012). This research area is vital, given that policymakers often possess substantial resources, which they can utilize to provide targeted benefits to favored groups or even themselves (Acemoglu and Robinson, 2001; Grossman and Helpman, 2001; Lohmann, 1995; Bennedsen and Feldmann, 2006; Jain, 2001; Eckel et al, 2022; Fatas and Restrepo-Plaza, 2022). However, limited knowledge exists regarding how different governance arrangements effectively constrain policymaker behavior, particularly in the context of rent-seeking.

Our results show that, relative to non-democratic institutions (*Baseline* and *Random*), neither *Voting* nor *Referendum* significantly changes cooperation patterns. Citizens' condition their

cooperation with other citizens and with policymakers' distribution rules in remarkably similar ways, though we report some differences in the democratic conditions, but overall contribution levels remain unaffected. Policymakers condition the distribution of the public good differently in democratic and non-democratic settings: they are more responsive to the contribution discissions of citizens, allocating a greater share of the public good to those that contribute more than the average, and less of the public good to those that contribute less than the average. Hence, democratic institutions are effective in improving citizens' welfare by indirectly limiting policymakers' surplus. *Referendum* improves citizen welfare over both the *Baseline* and *Random* conditions, while *Voting* improves citizens' welfare relative to the *Baseline*, but not *Random* treatment.

Our results can be summarized in two findings. First, additional information about candidates (their altruism and skills are only available in *Voting*) does not induce citizens to vote differently (relative to the simpler binary choice and the reduced information load of *Referendum*). Second, our experiment is consistent with Christensen (2021)' survey experiment in that our participants exhibit a tolerance towards [political] outcome uncertainty. The simple twist of electoral fate that gives a random opponent the chance of ruling the governance game does not impede citizens to extract more surplus from policymakers. In line with Lanoue (1994), referenda can be hot guns voters are ready to shoot, not being outperformed by simple voting systems. While conditional behavior by citizens does not significantly change across treatments, policymaker behaviour does, and only in *Referendum* do policymakers strategically use transfers to stay in power, as losing power becomes significantly less likely if distribution was more equitable in previous periods.

The rest of the paper unfolds as follows. We describe the experimental design in section 2, the results in section 3 and conclude in section 4.

2. Design

2.1. Experimental game

Before the governance game starts, participants (i) receive a windfall endowment that they may partially or fully donate to a charity, and (ii) engage in a real effort coding task to earn the endowment they will use in the *governance game*: 20 experimental monetary units, EMUs, per round (Gangadharan et al., 2015; Charness et al. 2014; Erkal et al., 2011). In the

governance game that follows, participants make decisions in fixed groups of four for 20 rounds.

In the first round, one subject from each group is randomly designated as the policymaker. The other three participants become citizens, being instructions neutrally labelled (type X or Y). Citizens and the policymaker contribute to a public account that is doubled by the experimenters. By design, policymakers fully contribute the endowment to the public good, but citizens may contribute as much as they want from their individual endowment of 20 EMUs. Afterwards, the policymakers observe the individual contributions made by each citizen and decides how to divide the public good outcome between all four group members. Citizens receive feedback on the distribution rule among citizens and the round ends. Except for *Baseline*, where the policymaker does not change throughout the session, every four rounds policymakers may be removed from office. The payoff functions of policymakers, π_i^p, and citizens, π_j^c, follow:

$$\pi_i^p = e - c_i^p + 2 \cdot \left(c_i^p + \sum_{j=1}^{j=3} c_j^c\right) - \left(\sum_{j=1}^{j=3} d_j^p\right) = 2\left(e + \sum_{j=1}^{j=3} c_j^c\right) - \sum_{j=1}^{j=3} d_j^p \quad [1]$$

$$\pi_j^c = e - c_j^c + d_j^p \quad [2]$$

In both functions, *e* represents the endowment (20 Experimental Monetary Units), d_j^p the share of the public good distributed to each citizen by the policymaker, and c_i^p and c_i^c the policymaker and citizens' contributions, respectively [2].

Applying backward induction, rational and selfish policymakers distribute nothing and citizens, anticipating this outcome, do not contribute to the public good. In equilibrium, policymakers earn twice as much as citizens, as policymakers have full control over the outcome of their contribution to the public good, creating incentives for citizens to replace the policymaker. As discussed below, citizens' equilibrium incentives are identical in *Voting* and in *Referendum*.

2.2. Experimental Design

In the governance game run in the first *Baseline*, policymakers are never replaced, so citizens decide how much to contribute to the public good and policymakers distribute the public

[2] As policymakers have full control on the distribution of the public good, full contribution becomes a dominant strategy for rational policymakers maximizing their own payoff and for rational policymakers maximizing team earnings.

good any way they choose. It is a low-outcome-uncertain treatment because participants know the policymaker from the beginning and are aware that they will not be replaced. Additionally, even when it is not a democratic regime, policymakers know that they will be interacting with the same participants for 20 rounds, opening the door for reputation building and policymakers sharing the public good to promote citizens' contributions.

In our second baseline, *Random*, every fourth round one group member is randomly chosen to replace the policymaker.[3] Considering that participants cannot develop tacit arrangements with the policymakers (because they have no voice, or political institution to make policymakers accountable), and the odds for predicting the next ruler are low (probability = 0.25 for each group member), this treatment qualifies as a high-outcome-uncertain condition. In these two treatments the only piece of information citizens receive is the policymaker's distribution rule, and the only decision they make is how much to contribute to the public good.

In the *Voting* treatment, a policymaker is **elected** at the start of rounds 1, 5, 9, 13, and 17. All group members receive information about candidates, including their productivity in the coding task and their donation to the charity (subjects were not aware that these data would be revealed to group members later in the session).[4] We employ the donation as a means to inform voters about the candidate's prosocial tendencies. The endowment for the governance game, acquired during the coding task, serves as a metric to gauge the candidate's legitimacy. In all elections but the first one, citizens are aware of how incumbents distributed the public good in the past (their previous performance). Citizens and policymakers cannot vote for themselves, and the election is determined by a simple majority rule, being the policymaker randomly chosen among participants with more votes in case of a tie. The combination of available information and voting rights make this treatment a low-outcome-uncertain condition i.e. participants can directly affect the probability of their favorite candidate to win (probability ≥ 0.25). Furthermore, the iterative nature of the exercise enables participants to form beliefs about fellows' preferences towards policymakers, enhancing their ability to anticipate and make more informed predictions about who is likely to be elected next (Grandi et al., 2022).

[3] We label this second baseline as Random, per the random replacement of policymakers.
[4] Note that performance in the coding task has no direct bearing on how policymakers distribute the public good. However, subjects may form beliefs about the competence of the policymakers, and vote based on those beliefs. Hence, we decided to include performance in the coding task as a weak signal of competence.

In *Referendum,* citizens are aware of the policymaker's performance and do not receive information about their donations and skills. The decision process follows a majority rule where citizens decide whether to keep the incumbent four more rounds or replace her with another group member randomly chosen. Participants affect the probability of not repeating the policymaker but have no say in improving the odds for another candidate, for which it is not a democratic regime. Moreover, the probability of getting the preferred policymaker in power is conditioned to the probability of kicking the incumbent out. It is a more complex thinking process, for which *referendum* is acknowledged as a high-outcome-uncertain condition.

As our design includes two conditions in which policymakers are randomly and exogenously selected (*Baseline* and *Random*) and two conditions in which they are endogenously selected by participants, one dimension of our experimental design is the Policymaker selection (*Exogenous* or *Endogenous*). In two conditions policymakers may change randomly (*Random* and *Referendum*), so uncertainty about the new policymaker is High, while in the other two (*Baseline* and *Voting*) uncertainty is Low because policymaker is always the same (*Baseline*) or because they are not randomly selected but chosen by participants (*Voting*). Our 2x2 factorial design is summarized below in Figure 1 below:

		Policymaker selection	
		Exogenous	Endogenous
Outcome uncertainty	Low	Baseline	Voting
	High	Random	Referendum

Figure 1: Experimental design

2.3. Procedures

We conducted a 2x2 between-subjects design. All sessions took place at the University of Valencia (LINEEX Lab), utilizing a standard student subject pool. Each treatment consisted of 60 subjects, forming 15 groups with four subjects each, thereby providing 15 independent observations per treatment. Sessions consisted in four phases (charitable giving task, coding task, public goods game, and final survey) that in total had an average duration of 2.5 hours. Participants received 5 euro show-up fee and were paid for each phase, except the survey. Subjects were paid for all rounds of the game. They received an average payment of 24 euros across all tasks. To maintain consistency, all earnings were expressed in terms of EMUs

(experimental monetary units), which were subsequently converted to euros at the conclusion of the experiment.

2.4. Hypotheses

H1. Democracy fosters conditional cooperation: we anticipate that varying governance structures will give rise to distinct cooperative norms, as suggested by Bowles and Polanía-Reyes (2012) and Rosato (2003). Aligning with Kant's assertion regarding the fostering of mutual cooperation by democracies (Sørensen, 1992), we posit that participatory institutions—specifically those employing voting mechanisms such as *Voting and Referendum*—may cultivate a greater sense of conditional cooperation among individuals compared to non-democratic counterparts represented by the *Baseline and Random* conditions.

H2. Democracy reduces rent-seeking behavior:
The existing literature highlights the tendency of policymakers to employ their authority in favor of specific groups, and at times, even for personal gain (Acemoglu and Robinson, 2001; Grossman and Helpman, 2001; Lohmann, 1995; Bennedsen and Feldmann, 2006; Jain, 2001; Eckel et al., 2022; Fatas and Restrepo-Plaza, 2022). Given that the power to distribute public goods is a commonality across our four conditions, while the certainty of remaining in power is not, we anticipate that more democratic regimes will mitigate rent-seeking behavior. In contrast to the *Baseline and Random* scenarios, we expect that the *Voting and Referendum* treatments will yield lower surplus for policymakers and higher benefits for citizens.

H3. Outcome uncertainty generates clientelist behavior: policymakers might leverage their role in resource allocation as a strategy to maintain political power (Martinico, 2019). Consequently, we anticipate that their likelihood of winning an election in the *Voting* treatment or avoiding a referendum loss in the *Referendum* condition will be contingent on the extent to which they appropriate the public good. The higher the proportion they allocate for their own benefit, the lower their probability of retaining power.

3. Results

Table 1 below presents descriptive data on average treatment effects using three basic performance variables: contributions to the public good (set to the full endowment for policymakers by design: *Contribution*), the percentage of the public good assigned to citizen (row # 2: *Distribution*) and the percentage assigned to the policymaker themselves (row # 5: *Distribution*). The final performance variable is the surplus generated for each player. For citizens, this is calculated as the earnings less the initial endowment (row # 3) and for policymakers as the earnings less twice the initial endowment (row # 6). As policymakers perfectly control distribution of the public good, the surplus is simply what they earn from the game less their income maximizing strategy of keeping the entire amount generated by their contribution to the public good.

Table 1: Descriptive statistics

		N	Baseline	Random	Voting	Referendum
Citizens	Contribution	900	14.74	14.95	15.72	16.20
			(3.20)	(3.55)	(3.79)	(5.88)
	Distribution	900	17.44	18.22	20.04	21.72
			(4.37)	(4.94)	(4.57)	(2.28)
	Surplus	900	8.36	10.00	12.32	14.20
			(4.99)	(6.41)	(5.75)	(2.72)
Policymakers	Contribution	300	20.00	20.00	20.00	20.00
			(0.00)	(0.00)	(0.00)	(0.00)
	Distribution	300	47.67	45.35	39.88	34.85
			(13.12)	(14.82)	(13.70)	(6.84)
	Surplus	300	19.15	14.85	10.20	6.01
			(13.94)	(9.36)	(9.29)	(4.52)

As in variants of this governance game (Cardenas, 2004, Hamman et al, 2011), contributions to the public good are remarkably high, between 74% of the endowment in *Baseline* to 81% in *Referendum*.[5] Even when we find no significant differences between treatments, table 1 orders citizens' contributions across treatments cleanly: contributions to the public good monotonically increase from *Baseline* (14.74) to *Random* (14.95, Wilcoxon-Mann-Whitney test relative to the *Baseline* p-value<0.65), *Voting* (15.72, p-value<0.23) and *Referendum* (16.20, p-value<0.27), and the share of the public good kept by policymakers decrease from

[5] Interestingly, there is no or little decline in public good provision by round, indicating that policymakers are able to use distribution effectively to maintain contributions.

47.67 in *Baseline*, to 45.35 in *Random*, 39.88 in *Voting* and 34.85 in *Referendum*.

Participants' shares of the public good are also nicely ranked, and differences become significant as voting rights and outcome uncertainty move forward. Starting with row 2, we note that in the *Baseline*, citizens receive 17.44 percent of the public good on average, increasing to 18.22% in the Random treatment ($p=0.65$); to 20.04% under Voting ($p<0.07$); and to 21.72% in *Referendum* (a 24.54% increase: $p<0.0017$). Conversely, policymakers assign 47.64 percent of the public good to themselves in the *Baseline* (row # 5), but this drops to 45.35% under *Random* ($p=0.65$); to 39.88% under Voting ($p<0.07$); and to 34.85% in *Referendum* ($p<0.0017$), a drop of 26.85%. This means that the surplus earned by citizens increases from *Baseline* to *Referendum*, and the surplus earned by policymakers reduces (rows 3 and 6). The differences are not significant between our non-democratic regimes (*Baseline and Random*); are marginally significant while adding *Voting ($p<0.07$),* and becomes strongly significant when comparing the *Referendum* surplus with the *Baseline ($p<0.0017$).*

Main results

Table 2 shows the results of panel data regressions using individual contributions to the public good made by citizens, clustering standard errors at the group level. Model 1 presents the treatment effects with a dummy variable equaling 1 for the rounds where a new policymaker is possible (that is, rounds 1, 5, 9, 13, and 17). Model 2 interacts the treatment effects with the new policymaker round dummy. Model 3 estimates treatment effects with round fixed effects, while model 4 includes controls for sociodemographic (age and gender) and behavioral characteristics (risk aversion, time patience, social preferences) of subjects. Departing from what we posit in our first hypothesis, table 2 clearly shows that subject contributions are unaffected by the treatments. Models 1 and 2 also show that subjects do not respond to new policymakers by increasing their contributions. Overall, contributions remain stable across all treatments and specifications, and there are no signs of cooperation differences between conditions.

Table 2: Treatment effects on contributions

	(1)	(2)	(3)	(4)
Treatment: Random	0.209	0.007	0.195	0.169
	(1.19)	(1.29)	(1.19)	(1.20)
Treatment: Voting	1.067	1.222	1.074	0.750
	(1.26)	(1.30)	(1.27)	(1.22)
Treatment: Referendum	1.371	1.385	1.395	1.024
	(1.08)	(1.13)	(1.08)	(1.17)
New Policymaker (NP) Round Dummy	-0.062	-0.095		
	(0.20)	(0.34)		
Random * NP Round		0.809		
		(0.59)		
Voting * NP Round		-0.619		
		(0.46)		
Referendum * NP Round		-0.056		
		(0.47)		
Constant	14.75***	14.76***	11.29***	8.905***
	(0.82)	(0.86)	(0.71)	(2.26)
Round Fixed Effects	No	No	Yes	Yes
Controls	No	No	No	Yes
Overall R-squared	0.008	0.009	0.048	0.088
P	0.631	0.149	0.000	0.000
Observations	3,600	3,600	3,600	3,600
Number of groups	60	60	60	60

DV: Contribution by citizens (t)
Controls: Risk, time, social preferences, age, gender
Standard errors with group level clusters in parentheses
*** p<0.01, ** p<0.05, * p<0.1

If cooperation levels are not altered by democratic institutions, what about the treatment of citizens by policymakers? Table 3 shows that, in line with Table 2, public good shares received by citizens in *Voting* and *Referendum* are above the ones citizens receive in *Baseline* and *Random* (even when significance is above 5% in models 1-3 for *Voting*). As in Table 2, model 1 in Table 3 presents the treatment effects with a dummy variable equaling 1 for the rounds where a new policymaker is possible (that is, rounds 1, 5, 9, 13, and 17). Model 2 interacts the treatment effects with the new policymaker round dummy. Model 3 estimates treatment effects with round fixed effects, while model 4 includes controls for socio-demographics (age and gender) and behavioral characteristics (risk aversion, time patience, social preferences) of subjects. The results in Table 3 show that the percentage of the public good assigned to citizens in *Random* is statistically identical to the baseline. However, new policymakers do indeed assign more of the public good to citizens in the first round after

becoming policymakers, but soon reduce their distribution levels such that we find no main effect of the treatment. Moreover, these results seem to partially back up our second hypothesis regarding rent-seeking behavior. We find that *voting* marginally increases policymaker distribution to subjects, while *Referendum* clearly increases policymaker distribution to citizens above the *Baseline*. Furthermore, Table 3 also suggests that *Referendum* does not empower citizens less than *Voting*, as competition between candidates yields slightly smaller shares than the *simple twist of fate* embedded in the *Referendum*, even when coefficients are not statistically significant (p-values 0.39 in model IV).

Table 3: Treatment effects on distribution of the public good to citizens

	(1)	(2)	(3)	(4)
Treatment: Random	0.693	0.203	0.689	0.676
	(1.66)	(1.77)	(1.66)	(1.64)
Treatment: Voting	2.821*	2.955*	2.801*	2.443
	(1.62)	(1.68)	(1.62)	(1.61)
Treatment: Referendum	4.073***	3.990***	4.069***	3.621**
	(1.27)	(1.35)	(1.28)	(1.42)
New Policymaker (NP) Round Dummy	1.197***	0.759**		
	(0.26)	(0.38)		
Random * NP Round		1.961***		
		(0.72)		
Voting * NP Round		-0.539		
		(0.55)		
Referendum * NP Round		0.332		
		(0.52)		
Constant	17.15***	17.25***	17.63***	14.89***
	(1.12)	(1.17)	(1.11)	(3.14)
Round Fixed Effects	No	No	Yes	Yes
Controls	No	No	No	Yes
Overall R-squared	0.028	0.030	0.062	0.088
P	0.000	0.000	0.000	0.000
Observations	3,600	3,600	3,600	3,600
Number of groups	60	60	60	60

DV: Percentage of the public good received by citizens
Controls: age, gender, risk, time, and social preferences
Standard errors with group level clusters in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Overall, did not support our hypothesis of the role of democratic systems in promoting cooperative behavior (H1), but partially demonstrated that policymakers behavior change in the presence of democracy (H2), our second hypothesis, with policymakers assigning greater shares of the public good to citizens under our two democratic regimes *Voting* and *Referendum*.

Citizen and policymaker interactions

To interpret these results and fully testing H1 and H2, we start exploring whether institutions alter the conditional cooperation patterns of citizens (when adjusting their contributions to the contributions of others) and the reciprocity patterns between citizens and policymakers (Croson et al, 2005 and 2015 explore conditional cooperation in linear public goods games, Fatas et al, 2018, conformism with the decisions of others in a variety of strategic and non-strategic settings).

Table 4a: Citizen and policymaker interactions – Conditional cooperation

	Conditional contribution
Random	-0.012
	(0.33)
Voting	-0.111
	(0.30)
Referendum	-0.251
	(0.33)
L (Above)	-0.380***
	(0.11)
Random * L (Above)	0.117
	(0.14)
Voting * L (Above)	0.290**
	(0.13)
Referendum * L (Above)	0.355***
	(0.13)
L (Below)	0.705***
	(0.12)
Random * L (Below)	-0.164
	(0.16)
Voting * L (Below)	-0.103
	(0.17)
Referendum * L (Below)	-0.156
	(0.21)
Constant	-3.410***
	(0.63)
Round Fixed Effects	Yes
Controls	No
Overall R-squared	0.171
P	0.000
Observations	3,296
Number of groups	60

DV: Change in contributions of citizen *i* (in round *t*, relative to round *t-1*) [Contribution (t) – Contribution (t-1)]
L(Above) = Contribution (t-1) – Average contribution (t-1) if positive, 0 otherwise
L(Below) = Average contribution (t-1) – Contribution (t-1) if positive, 0 otherwise

Standard errors with group level clusters in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4a reports the outcome of a panel data regression with the change in contribution to the public good as the dependent variable. Our main independent variable is the contribution of citizens in the previous round, relative to the average contribution of the other citizens in the group in the previous round. *L (Above)* measures the distance between the contribution of subject *i* and the average group contribution in t-1 (if above, 0 otherwise), and *L (Below)* the distance between the contribution of subject *i* and the average group contribution in t-1 (if below, 0 otherwise; following Croson et al, 2015, Fatas et al 2020).

The adjustment process of contributions is similar across treatments. When above the group's average contribution in *t-1*, subjects decrease their contribution in *t* (as the negative coefficients on the un-interacted L(Above) term shows). If below the contribution of others in *t-1*, subjects significantly increase their contribution to the public good in *t*. Interestingly enough, the adjustment process is asymmetric: subjects adjust their contributions more when they are below, relative to when they are above.

In other words, it is stronger when adjusting up (if below the others) than when adjusting down (if above the others). This pattern goes against previous evidence in standard public goods games (e.g., see Table 8 in Fatas et al, 2020). Furthermore, note that when adjusting from above, the interaction terms are significant for the *Voting* and *Referendum* treatments, and are similar in magnitude to the un-interacted term, indicating that subjects are not adjusting their contributions downwards in these treatments when they are above the average contributions of their group members. This finding partially supports H1 as contributions are responding more strongly in more democratic systems, even when such response occurs upwards and not the other way around. The *Voting* and *Referendum* treatments reduce the asymmetry in contribution adjustments, presumably because citizens can avail alternate measures to punish policymakers.

Our second checkpoint deals with the interaction between the actions of citizens (how much they contribute to the public good) and the actions of policymakers (how they distribute it). We will refer to this interaction as reciprocity in a loose sense, meaning that citizens and policymakers may condition their actions to the actions of other players (policymakers and citizens, respectively). We proceed in two stages, first with citizens and then with the conditional behavior of policymakers.

Table 4b: Citizen and policymaker interactions – Conditional cooperation over egalitarian rule

Citizens' contribution	
Random	0.217
	(1.03)
Voting	0.718
	(1.05)
Referendum	0.408
	(0.99)
L (Dist. Above 25%)	-0.087
	(0.07)
Random X L (Dist. Above 25%)	0.014
	(0.08)
Voting X L (Dist. Above 25%)	0.001
	(0.08)
Referendum X L (Dist. Above 25%)	0.001
	(0.08)
L (Dist. Below 25%)	-0.313***
	(0.04)
Random X L (Dist. Below 25%)	-0.035
	(0.06)
Voting X L (Dist. Below 25%)	-0.044
	(0.05)
Referendum X L (Dist. Below 25%)	-0.019
	(0.05)
Constant	14.77***
	(1.01)
Round Fixed Effects	Yes
Controls	No
Overall R-squared	0.369
P	0.000
Observations	3,420
Number of groups	60

DV: Contribution [Contribution (t)] by citizen *i* (in round *t*). L (Dist. Above 25%) = absolute difference from above between the share of the public good received by citizen *i* in t-1 and 25% of the public good (0 otherwise)
L (Dist. Below 25%) = absolute difference from below between the share of the public good received by citizen *i* in t-1 and 25% of the public good (0 otherwise). Standard errors with group level clusters in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4b presents the outcome of a panel data regression with citizens' contributions to the public good as dependent variable and two lagged independent variables: the distance between the share of the public good received by each citizen and the egalitarian share of 25% (that is, all group members, 3 citizens and 1 policymaker equally sharing the public good). While *L (Dist. Above 25%)* captures the absolute difference from above between the

share of the public good received by citizens in *t-1* and receiving 25% (0 otherwise), *L (Dist. Below 25%)* captures the absolute difference from below between the share of the public good received by each citizen in *t-1* and receiving 25% of the public good (0 otherwise). Our benchmark is that citizens receive a fair and equal share of the public good.

Table 4b shows that receiving less than the fair rule (25% of the public good) in *t-1* significantly decreases the contribution to the public good in *t*, and that this effect does not vary by treatment. For each percentage point below 25%, citizens decrease their contribution between 0.31 units in *t*. The interaction terms are all insignificant indicating that this effect does not vary across treatments. Table 4 b also shows that receiving more than the fair rule (25% of the public good) in *t-1* also decreases contributions in *t*, but the result is not significant and does not vary by treatment. Effectively, this means that when citizens are given less than the fair share, they reduce their contributions in subsequent rounds, but giving citizens more than the fair share has no effect on contributions. The treatment effects are invariant indicating that citizens maintain their strategy across treatment conditions. Finally, Table 4c analyzes the generosity and severity of policymakers with citizens.

Table 4c: Citizen and policymaker interactions – PM distribution

Distribution	
Treatment: Random	-0.011
	(1.90)
Treatment: Voting	2.141
	(1.56)
Treatment: Referendum	3.542**
	(1.40)
Above	0.700***
	(0.19)
Random * Above	0.463*
	(0.28)
Voting * Above	0.432
	(0.36)
Referendum * Above	0.675**
	(0.34)
Below	-1.289***
	(0.14)
Random * Below	0.001
	(0.19)
Voting * Below	-0.160
	(0.18)
Referendum * Below	-0.389**
	(0.17)
Constant	18.88***

	(1.19)
Round Fixed Effects	Yes
Controls	No
Overall R-squared	0.412
P	0.000
Observations	3,600
Number of groups	60

DV: Individual share of PG received by citizen *i* (in round *t*)
Above = Contribution (t) – Average contribution (t) if positive, 0 otherwise
Below = Average contribution (t) –- Contribution (t) if positive, 0 otherwise
Standard errors with group level clusters in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4c explores how contributions of citizens are rewarded by policymakers. Consistent with the patterns reported in tables 4a and 4b, policymakers provide a greater share of the public good for citizens that contribute greater than the average contribution and provide a smaller share to those citizens that contribute less than the average contribution. Notably, rewards jump up from *Baseline* to *Random*, but they do not similarly increase from *Random* to *Voting* and from *Random* to *Referendum*, suggesting that, in contrast to our second hypothesis (H2), having the capacity to vote does not change the way citizens are perceived (and rewarded) by policymakers. When contributing less than the average, citizens are punished by policymakers with a relatively smaller fraction of the public good. Punishment happens in a very similar manner across the *Baseline*, *Random*, and *Voting* treatments, but significantly increases with *Referendum*.

So far, we report that the treatments cause no real change in citizen contribution behavior. However, policymakers respond sharply to the *Referendum* treatment (and, more tentatively, to *Voting* as well), by distributing a greater proportion of the public good. We find that citizens respond to peer contributions differently in the two *Voting* conditions, by maintaining high above average contributions when they are indeed above average. We find that this is because policymakers provide a greater share of the public good to citizens when they contribute at above average levels, particularly under Referendum. Furthermore, policymakers punish more severely when citizens contribute less than average levels under referendum. Hence, while in the *Baseline* policymakers respond to citizen behavior, the scale of distribution increases under *Referendum*, yielding increases in policymaker distributions, but no real effect on citizen contributions.

Putting together Tables 2, 3, and 4, democratic regimes like *Voting* and *Referendum* empower citizens to increase their control over policymaker (as per in H2), and only change their

cooperation patterns when their contributions exceed the group average (in contrast to H1). Neither citizens exhibit different cooperation patterns (as suggested by Table 2), however, their interaction with policymakers is substantially altered when reacting to their distribution decisions (as evidenced by Table 4b). Table 4c strongly suggests that policymakers reward and sanction contributions by citizens in a similar fashion: they are more severe with citizens contributing less than the rest and reward them prudently if contributing more than others (especially in *Referendum*).

Table 5 shows that the distributional pattern documented in the main results is associated with a transfer of surplus to citizens from policymakers. In Table 5 we use surplus as our dependent variable, defining surplus as the amount earned by citizens beyond what they received as an endowment (20 EMU), and as the amount earned by policymakers beyond twice their contribution to the public good (by design, 40 EMU). In other words, surplus captures how the positive group externality associated with the public good provision is shared in different conditions. Models 1 and 2 (3 and 4) in Table 5 shows how citizens (policymakers) extract significantly more (less) surplus under democratic schemes (*Voting* and *Referendum*) than in *Baseline* or *Random* (and differences between *Referendum* and *Voting* are statistically insignificant).

Table 5: Treatment effects on subject surplus

	Citizens		Policymakers	
	I	II	III	IV
Random	1.560	1.444	-3.932	-2.749
	(2.06)	(2.00)	(4.24)	(4.23)
Voting	4.116**	3.718*	-8.392**	-5.546
	(1.99)	(1.97)	(4.27)	(4.24)
Referendum	5.518***	5.146***	-12.21***	-9.612**
	(1.54)	(1.68)	(3.71)	(3.77)
Constant	7.367***	5.964*	11.20***	16.37**
	(1.28)	(3.35)	(3.72)	(7.12)
Round Fixed Effects	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Overall R-squared	0.091	0.104	0.108	0.143
P	0.000	0.000	0.000	0.000
Observations	3,600	3,600	1,200	1,200
Number of groups	60	60	60	60

DV: Surplus= (Earnings-Endowment) for citizens and (Earnings-Endowment) for PM
Controls: age, gender, risk, time, and social preferences
Standard errors with group level clusters in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 2 below nicely plots how the surplus goes from policymakers to citizens across conditions.

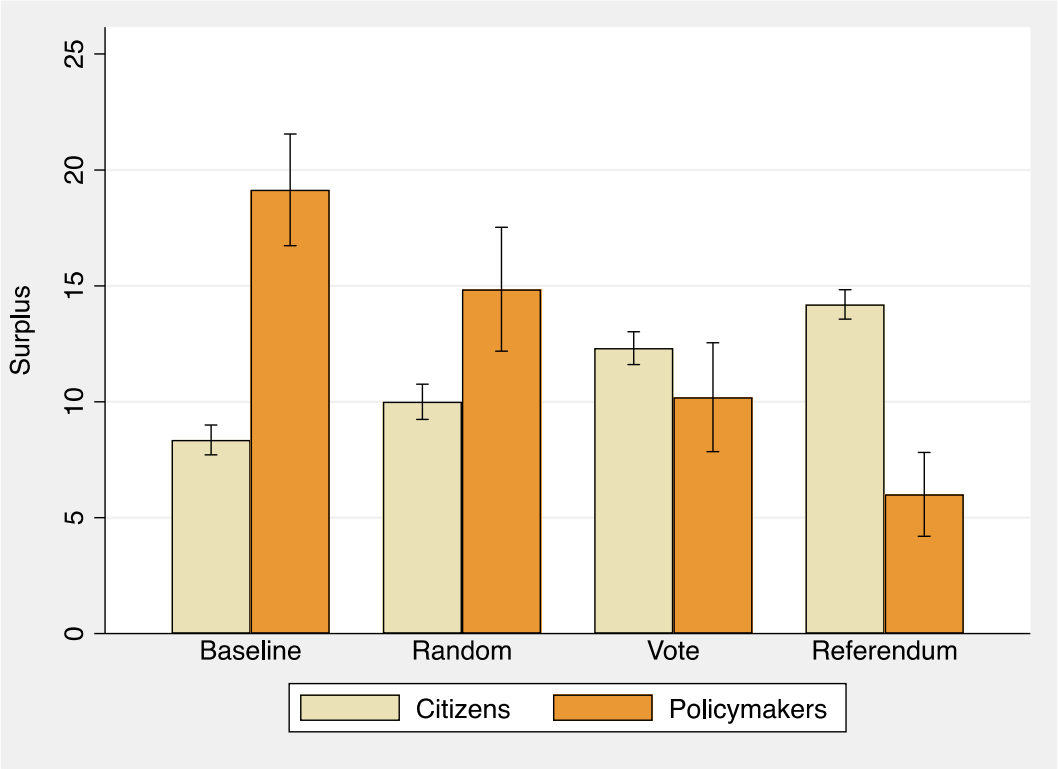


Figure 2: Surplus

We already rejected that the democratic *Referendum* and *Voting* schemes triggered different cooperation levels or different patterns of cooperation. The change in surplus stems from policymakers keeping lower levels of surplus under democratic regimes, driven by greater intensity of responsiveness to citizen contributions. Surplus is transferred from policymakers to citizens in democratic regimes like *Voting* and *Referendum*, less in the former than in the latter.

Exploring voting patterns

Why do *Voting* and, particularly, *Referendum* give citizens an edge (relative to other conditions)? Our third hypothesis (H3) placed the burden of the proof of the role of outcome uncertainty (*Referendum)* in leveraging clientelist behavior to maintain the ruling position. Even if relative levels of cooperation are not judged differently by policymakers, they may still strategically use their capacity to distribute the public good to appease citizens and

increase the chances of being reelected (in *Voting*) or not being kicked out of office (in *Referendum*).

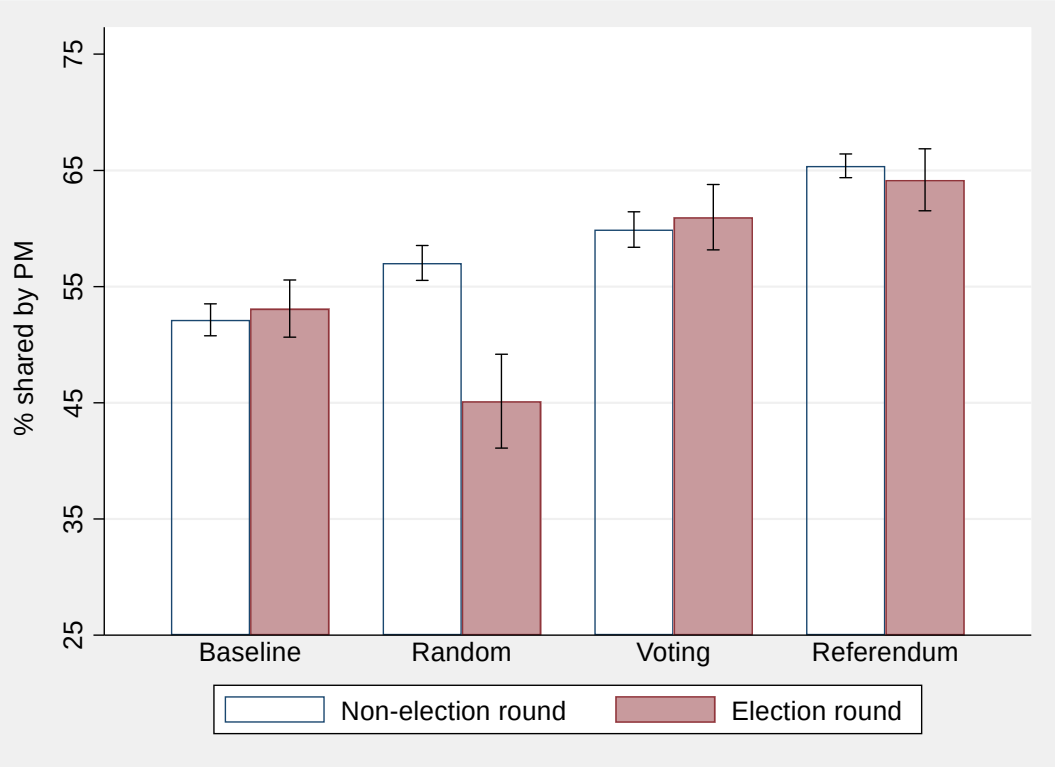


Figure 3: Distribution in election and non-election rounds

Figure 3 shows that policymakers do not behave significantly different in election periods than in other rounds, except for the *Random* condition. Not surprisingly, when policymakers in *Random* are about to leave office (but not before), they share less public good with citizens knowing that in the election round any good deed (following a generous and forward-looking sharing rule) yields no future benefits for them. In non-electoral periods, however, they may still benefit from reputation building and more sound distribution decisions, as keeping most of the public good for themselves may trigger a non-cooperative reaction by citizens.

Table 6 explores how policymakers use their distribution power to appease citizens and increase their chances of staying in office. All four models are categorical panel data Probit models in which the determinants of being kicked out of office are analyzed in *Voting* (models 1 and 3) and *Referendum* (models 2 and 4), without and with additional controls (models 1 and 2 versus 3 and 4). While the amount kept by the policymaker plays a significant role in predicting the likelihood of losing power in *Referendum*, it plays no significant role in *Voting* (with or without additional controls). The results are consistent with H3, and the idea that political competition between candidates and the outcome uncertainty of

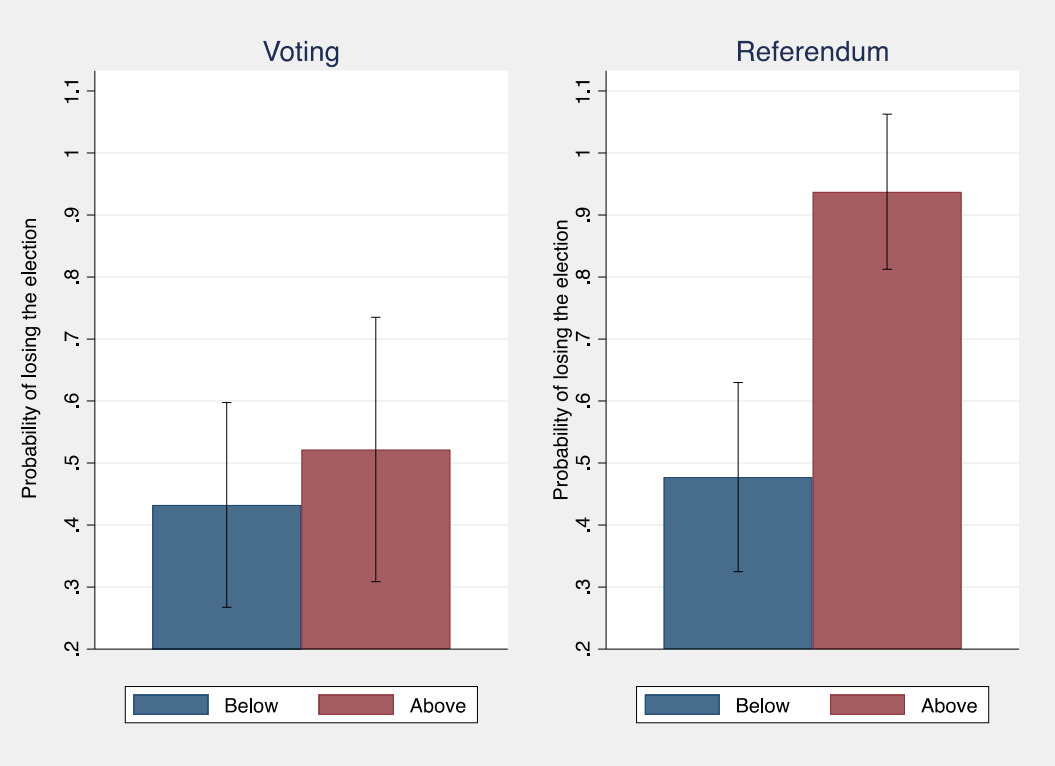
the *voting* and *referendum systems*, may be driven by citizens assessing several factors beyond the pure distribution of resources. When an *In or Out* referendum (the *simple twist of fate*) threatens policymakers, some successfully use their distributional capacity to perpetuate themselves in power by unconditionally giving citizens the election transfers they want (see models 5 and 6).

Table 6: Marginal Effects of Election Outcome and Distribution

	(1) Voting	(2) Referendum	(3) Voting	(4) Referendum	(5) Both	(6) Both
Predicted	*.465*	*.648*	*.466*	*.694*	*.556*	*.556*
Amount kept (%)	0.00335	0.0377***	-0.00840	0.0306***	0.00354	0.00330
	(0.00475)	(0.0111)	(0.00669)	(0.0115)	(0.00471)	(0.00491)
Referendum	--	--	--	--	-0.953***	-0.966***
					(0.0910)	(0.0748)
Referendum*Amount (%)	--	--	--	--	0.0351***	0.0370***
					(0.0131)	(0.0138)
Controls	No	No	Yes	Yes	No	Yes
Observations	60	60	60	60	120	120

DV: probability of losing the election (it takes the value of 1 if an election defeat happens, 0 otherwise). Only data form Voting and Referendum treatments considered. Amount kept by the policymaker as the average of the percentage of the public good across the election cycle rounds; Controls: Age, Gender, Risk, Time, Social preferences of incumbent, and election cycle (from the first election cycle comprising rounds1-4, to the last cycle, rounds 13-16; we exclude the last election from the analysis as it does not end in a new election, and to avoid end of the world effects). Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

We illustrate the power of differences detected by Table 6 in Figure 4. In this figure we plot the predicted probability (as estimated by models 3 and 4 in Table 6) of losing power as a function of how the policymaker shared the public good in the previous election cycle. We divide policymakers by the average amount they kept for themselves in the periods previous to the election and split the results in two: those whose average distribution was below the median (around 50%), and those who were above. While keeping more of the public good substantially increases the likelihood of losing power in *Referendum*, it does not change the fate of policymakers in *Voting*. Consistent with our hypothesis, H3, some policymakers in *Referendum* anticipate the power of clientelist, unconditional transfers, and increase their chances of retaining power by being more generous. This channel is not observed in the *Voting* condition, in which electoral competition happens between all candidates, and additional information is provided to voters.



Probability of losing the referendum/election as a function of how the policymaker distributed the public good in the previous block of 5 rounds, relaive to the median. Predictions from models (3) and (4) in Table 6.

Figure 4: Electoral outcomes and PM sharing
(sharing above or below the median in the electoral cycle)

Overall, we show that citizens are successful in extracting greater surplus under the *Referendum* treatment, specifically by using their power to punish policymakers that keep greater shares of the public good. Relative to the voting treatment, citizens are more likely to remove the policymaker the greater the policymaker extracts from the public good. Policymakers respond to this by reducing the amount they extract, and distributing it to the citizens in a more egalitarian fashion, which make them in turn more tolerant to the outcome uncertainty. This means that even when citizen contributions do not change in response to the institutional arrangements, outcomes for citizens are better in our democratic treatments, and relatively greater under a *Referendum*, due to the greater political power enjoyed by the citizens.

4. Conclusions

In this paper we present the results of a series of governance experiments. Our experimental subjects are assigned to small groups of four, with one subject redistributing resources generated by the voluntary contributions of group members to a public good. The experiment tests how different political institutions (democratic and non-democratic) promote cooperation between participants, curbs policymaker rent-seeking behavior, and improves social welfare.

Overall, we find robust evidence that voting institutions do not significantly improve social welfare overall (that is, contributions by citizens are no different), but they improve the earnings of citizens by reducing policymaker rent-seeking behavior. We offer direct evidence that the threat of removal from their position is a strong motivator for policymakers in constraining their behavior, as gains in citizens' earnings are directly attributable to reductions in rent-seeking rather than through increasing citizen contributions and public good provision.

Relative to our two baselines (*Baseline* and *Random*), we do observe slight differences in cooperation patterns under *Voting* and *Referendum*. When citizens contribute more that the average citizen, they do not adjust their contributions downwards in *Voting* or *Referendum* but maintain the same strategy of increasing contributions when contributing less than the average. This change in strategy is not enough to yield a significant change in contributions overall but is worthy of noting. Policymakers' distribution behavior is similar in all treatments except for *Referendum*, where they are more responsive to contributions below and above the average contribution.

Democratic settings improve citizens' welfare by reducing policymakers' gains and by generating more egalitarian sharing rules. *Referendums* are effective in improving citizens' welfare over *Baseline* (as citizen surplus increases by 28% and policymaker rents decrease by 62%) and in increasing policymaker transfers relative to both *Baseline* and *Random*. *Voting* does marginally improve citizens' welfare relative to *Baseline* (citizens' surplus up by 21% and policymaker rents down by 43%) but not relative to *Random*, in which policymakers are randomly replaced every four rounds. While distribution rules change, overall contributions to the public good remain similar in all four conditions, with modest gains in the electoral treatments, and no statistically significant differences.

It appears that policymakers exhibit less tolerance towards outcome uncertainty compared to citizens. In our study, providing additional information about policymaker altruism and competence during the voting process does not significantly improve participants' ability to select more egalitarian policymakers. However, participants do respond to the self-serving behavior of rulers. Our experiment aligns partially with Christensen's (2021) findings regarding voters' acceptance of political uncertainty.

Citizens may find it easier to handle outcome uncertainty because policymakers tend to behave more favorably towards them in the referendum condition, where their aim is to secure continued power. In essence, policymakers strategically utilize public goods to appease citizens and ensure reelection only in the referendum scenario. In contrast, in the voting condition, distribution patterns are not closely linked to electoral outcomes.

In line with our companion analysis in Brandts et al. (2023), our results support the view that democratic institutions based exclusively in voting rights do not necessarily outperform other institutions because, contrary to Sorensen (2009), they do not facilitate the emergence of new behavioral rules and more cooperative norms. With all the caution our highly specific research method imposes in these conclusions our paper contributes to our understanding of how political institutions trigger (or not) behavior change.

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