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Experimental evidence that quorum rules discourage turnout and promote election boycotts

Luís Aguiar-Conraria,[1*] Pedro C. Magalhães,[2] Christoph A. Vanberg[3]

Abstract

In most instances of collective decision-making, it cannot be expected that all persons who are entitled to vote will end up doing so. This has led institutional designers, out of concerns with the "legitimacy" of decisions, to introduce quorum requirements. A prominent example of this can be found in the context of direct democracy mechanisms, such as referenda and initiatives. We discuss the results of an experiment about the consequences of such quora. We show that quora lead to overall decreases in participation rates, dramatically increasing the likelihood of full-fledged electoral boycotts on the part of status quo supporters.

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1. Introduction

In most instances of collective decision-making, it cannot be expected that all members who are entitled to participate will always do so. There may even be instances where most members of a legislature, a city council, a club, a board of directors, or an electorate fail to show up when a decision is being made. This fact, together with concerns about the "legitimacy" and the "representativeness" of decisions, often results in the adoption of quorum rules. Examples of such rules can be found in the standing orders of legislatures (Rasch 1995; Squire 2006), corporate bylaws regulating boards of directors or shareholders meetings (Williams 2006), or statutes and constitutional laws regulating direct democracy mechanisms (Kaufmann et al. 2008).

The case of quora as applied to referenda and initiatives motivates particular interest. Direct democracy has become almost omnipresent in the US, with more than two-thirds of Americans living in areas where they can vote in referenda or initiatives (Matsusaka 2005). In fact, the use of direct democracy mechanisms has also grown dramatically all over the world (Altman 2011). Avowed concerns with distortions resulting from very low levels of turnout have led to the introduction of quorum rules in direct democracy (LeDuc 2003: 172; Qvortrup 2005: 173). Instead of allowing measures to pass if they simply obtain the support of the majority of those who vote, *participation quora* require that the total number of votes (either for or against the proposal) exceeds a particular threshold. In other cases, the required threshold is applied to the number of votes cast **in favor** of the proposal (*approval quora*). In several American states, the passage of initiatives involves participation quora, while Wyoming employs an approval quorum. Quora also exist in many national, state, and local referenda or initiatives in Europe (Aguiar-Conraria and Magalhães 2010a; Schiller 2011) and elsewhere (Qvortrup 2005; International IDEA 2008). As stated by the Council of Europe's advisory body on constitutional matters, in its "Code of Good Practice on Referenda" — Venice Comission (2007) —, quorum rules are a crucial aspect of the referenda design.

What are the actual consequences of quora? The issue has been the object of several theoretical studies. A first question concerns the consequences of participation quora. Côrte-Real and Pereira (2004) examine binary-choice voting rules and find that the

addition of a turnout condition such as a participation quorum encourages abstention, allowing Status Quo supporters to manipulate the outcome by failing to turn out. Similarly, Hizen and Shinmyo (2011) find that participation quorums create incentives for strategic abstention when the participation quorum is anything other than negligibly low. From a different perspective, that of a group turnout model, Herrera and Mattozzi (2010) argue that participation quora distort the incentives for parties and interest groups to mobilize the electorate. While one of the consequences is that such quora decrease turnout, another is that, under some conditions, they may actually favor Change.

A second question concerns the consequences of participation quora as compared to those of approval quora. Herrera and Mattozzi (2010) argue that their analysis of participation quora carries over to approval quora, making them essentially equivalent. Aguiar-Conraria and Magalhães (2010b) investigate the effects of quora in a pivotal voter model. Like Herrera and Mattozzi, they show that approval quora may also create incentives for strategic abstention and do not necessarily protect the status quo. However, they also show that approval and participation quora may not always produce the same results. In a different setup, where they distinguish between staying at home, specifically designed to replicate parliamentary situations, and abstaining, Laruelle and Valenciano (2011 and 2012) study majority rules coupled with several different quorum rules. They argue that the approval quorum is the one with the least distortionary effects, no matter what the majority rule is. Finally, Maniquet and Morelli (2011), using large Poisson voting games (Myerson 2000), conclude that approval quora dominate participation quora, in the sense that the former give the incentive for people to vote sincerely, while participation quora promote strategic abstention. Therefore, relative to the participation quorum, the approval quorum simplifies preferences and information aggregation.

In contrast, empirical research on the consequences of quora is very scarce. The only empirical work we are aware of is Aguiar-Conraria and Magalhães (2010a). Using data for all referenda held in current European Union countries from 1970 until 2007, they conclude that the existence of a participation quorum decreased turnout up to 14 percentage points, while no effect was observed in the presence of approval quora.

While this evidence supports the notion that approval quora are less discouraging for turnout in the real world, the use of field data involves a number of drawbacks. For example, it could be argued that the type of quorum rule in use may be endogenous. Another disadvantage is that we can only observe realized outcomes, and do not know the distribution of "actual" preferences. Finally, the outcomes we observe are at the aggregate level, and (so far) we have little information about the separate effects of quora on supporters and opponents of proposals. Similar concerns have motivated previous authors to conduct laboratory experiments to investigate factors affecting voter participation (Levine and Palfrey 2007; Duffy and Tavits 2008; Palfrey 2009).

Our approach builds on prior experiments on voter participation by introducing quorum rules into the pivotal voter model first developed by Palfrey and Rosenthal (1985). This model assumes that voters care solely about the outcome of the election. This implies, among other things, that an individual's decision to vote is driven by her beliefs about the likelihood of casting the decisive vote. Despite the starkness of this assumption, the implications and comparative static predictions of the pivotal voter model have been supported by experimental evidence (Levine and Palfrey 2007; Duffy and Tavits 2008; Palfrey 2009), while field evidence is consistent — at least in the margins — with the model's predictions (Blais 2000). Our study is, to our knowledge, the first to test the effects of quorum rules under this framework and in a controlled laboratory experiment.[4]

Our experimental design most closely resembles that of Levine and Palfrey (2007), who test the effects of "closeness" and electorate size on turnout in an experimental pivotal voter game. The main difference between our setup and theirs is that, in addition to implementing different distributions of preferences, we consider three different quorum restrictions (no quorum, approval quorum, participation quorum).[5] As in other experiments on the pivotal voter model, our setup measures an

[4] Previous papers by Schram and Sonnemans (1996), Morton and Tyran (2011), Battaglini et al. (2010), and Groβer and Schram (2006 and 2010) have provided laboratory evidence on strategic abstention.

[5] Another difference between our experiment and that of Levine and Palfrey (2007) is that we introduce aggregate uncertainty about the number of persons supporting each of the different options. Although this implies and added degree of complexity, we feel that uncertainty about the actual percentages for and against the measure under consideration is a realistic feature of most voting situations.

individuals' propensity to vote under different conditions by eliciting her willingness to incur costs associated with voting.[6]

The results confirm that quorum rules have very important consequences for turnout, and allow us, furthermore, to determine among which type of voters those consequences are stronger and what kind of quorum is more consequential. In particular, both approval and participation quora reduce participants' willingness to pay in order to cast a vote. Furthermore, quora have different effects conditional on electors' preferences: while the evidence suggests they may increase the turnout rate of measures' "Supporters" (preference for changing the Status Quo), it clearly shows that they strongly decrease the turnout rate of "Opponents" (preference for preserving the Status Quo). Finally, although Opponents are demobilized by both types of quora, this effect is significantly stronger under participation quora. Quora increase the probability that Opponents boycott the election, and do so massively (increasing that probability by more than 40 percentage points) in the case of participation quora.

2. The pivotal voter model with quorum requirements.

We base our experiments on the pivotal voter model of Palfrey and Rosenthal (1985. In this model, n electors $(i = 1, \dots, n)$ decide, using majority rule, between two options labeled "Change" and "Status Quo." Prior to voting, each player is randomly assigned a preference for one of the two options. The ex-ante probability that an individual prefers change is denoted μ. This probability is known and common to all players, while the preference actually assigned to each player is private knowledge.[7] We refer to the supporters of a proposal to change the Status Quo as "Supporters" and to those who prefer the Status Quo as "Opponents." After learning her own preference, each player decides to either *vote* or to *abstain* (as there is no incentive to vote for the opposing option, it is without loss of generality to restrict attention only to the participation decision.) Each voter faces a cost of voting given by c_i, where c_i is the realization of a uniformly distributed random variable, $c_i \sim U[0, c]$. After votes are cast, the outcome is determined depending on the number of votes actually cast. In

[6] Unlike Levine and Palfrey (2007), who estimate the willingness to pay from observed vote choices, we use the strategy method to directly elicit each subject's willingness to pay for casting a vote prior to revealing her randomly determined cost of voting.

[7] As mentioned above, we consider a game involving aggregate uncertainty, as in Borgers (2004) and Coate et al (2008).

the basic game, the option receiving the larger number of votes is chosen. In the games with quora, the Status Quo option wins unless the quorum is met *and* "Change" receives the majority of votes cast. [8] If 'Yes' wins the election, Supporters obtain a benefit b. Otherwise, Opponents have a benefit of x. An individual voter's utility is equal to the realized benefit minus voting costs incurred.

Since voting is costly, an individual can derive positive utility from voting only if she is pivotal, i.e. if her vote affects the (expected) outcome of the election. To understand incentives to participate, it is therefore helpful to consider the conditions under which an individual's vote makes a difference given each of the possible quorum rules. Consider Figures 1a, 1b, and 1c. In each figure, we assume an electorate of 9 players — the size of the electorate in our experiments. In each figure, every square corresponds to a possible combination of votes that the 8 other voters in a given group have cast. Black squares represent a situation where the Status Quo will win if the 9th voter abstains. White squares represent situations in which Change would win, and the grey squares situations in which a tie would result. The pairs of numbers inside each square show the impact of the 9th voter's decision to vote. The first number is the change in the probability of a Status Quo victory for a Opponents, while the second number is the change in the probability of a Change victory for a Supporter.

In Figure 1a, without quorum rules, assume that an elector *i* believes that without her vote the result will be 1 vote for the Status Quo and 2 for Change — (1,2). The pair [0.5;0] in the respective square means that, if individual *i* is an Opponent and decides to vote, the probability that the Status Quo prevails increases by 0.5, as her participation would guarantee a (2,2) tie. Conversely, if she is a Supporter, her vote will change the result from (1,2) to (1,3). Hence, her vote would have zero impact on the final outcome.

[8] Like Levine and Palfrey (2007), we assume that each option wins with 50% probability in case of a tie, provided that the quorum is met.

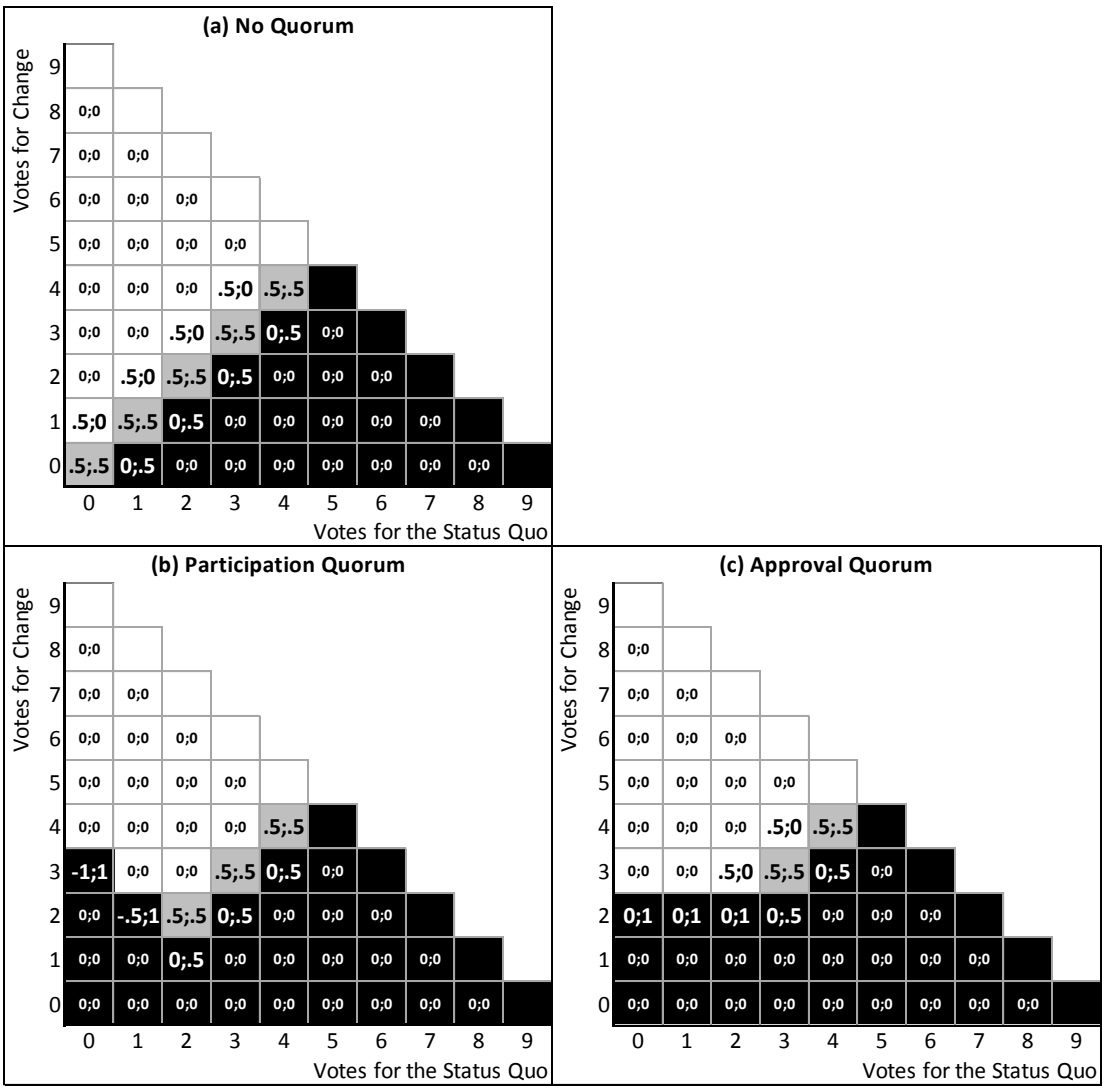


Figure 1: Set of voting outcomes. Each square represents a combination between votes for Status Quo (horizontal axis) and for Change (vertical axis). Black squares represent a Status Quo victory, white squares a Change victory, and the grey squares a 50% chance for either side. Pairs of numbers inside squares show the impact of the decision of whether to vote or not, reflecting the point of view of a given subject. The first number is the change in the probability of a Status Quo victory for an Opponent, while the second number is the change in the probability of a Change victory for a Supporter.

Looking at Figure 1b (participation quorum of 4), we can see that a supporter of Change is pivotal if her vote is necessary either to reach the majority of the votes or to meet the quorum. Again, in the particular case where an elector believes that the result will be (1,2), the pair of numbers inside the respective square is [-0.5, 1]. This means that a Supporter is pivotal, as her vote assures that the quorum is met, increasing the probability that the Status Quo is reversed by 1. However, for an Opponent, voting in this case will foster an undesirable outcome: instead of a victory for the Status Quo, obtained through the application of the quorum rule, a Opponents's participation will guarantee that the quorum is met, that the result is a

tie, and, thus, that the probability of a Status Quo victory actually *decreases* by 0.5: hence the negative numbers in cells (1,2) and (0,3). In other words, an Opponent may cast the decisive vote in two conflicting ways. She may be pivotal, in a desirable way, if her vote is necessary to reach majority for the Status Quo, but she may pivotal too to meet the quorum, in this case fostering the undesirable outcome of 'Change'. Under participation quora, Opponents may actually hurt themselves by voting.

Consider now Figure 1c, with an approval quorum of 3. The Status Quo region also increases in comparison with Figure 1a because it prevails whenever the number of votes for Change is less than 3. However, there is also a qualitative change on the probability of being pivotal. For an Opponent who believes that without her vote the outcome of the election will be (1,2), the impact of voting is zero: with or without her vote, the quorum is not met and the Status Quo prevails anyway. For a supporter of Change, the 'Yes' is decisive to reach the quorum, by moving the result from (1,2) to (1,3), creating incentives to vote that would not be there in the absence of quora. Hence, the pair [0;1]. Under approval quora, Supporters have an *additional* incentive to vote because there are two potential benefits (meeting the quorum *and* getting a majority) when in the absence of a quorum there is only one.[9]

A strategy for elector i is a function that specifies whether she votes or abstains for each possible realization of the idiosyncratic voting cost c_i. We look for symmetric Bayesian-Nash equilibria. It can be shown that in any such equilibrium, all voters use *cutoff strategies* according to which they vote if and only if their individual voting cost is below a given threshold value. Let γ_s and γ_o be the cut-off values for supporters of change and opponents, respectively.

The basic pivotal voter model (without quorum rules) makes a number of interesting predictions about the level of turnout, as measured by the expected level of participation given the equilibrium cutoff strategies. One of these is the so-called *competition effect*: the "closer" the race (as measured by the difference in the number

[9] As we have seen, Figures 1b and 1c introduce, respectively, a participation quorum of 4 and an approval quorum of 3. From the picture, it should be clear that the introduction of a quorum has two effects: it changes the incentives structure, and increases the number of possible results that favor the status quo. Thus there are two factors potentially affecting outcomes in our different experimental treatments. The particular quorum thresholds chosen (AQ=3 and PQ=4) minimize the difference in the size of the status quo region (the number of voting outcomes favoring the status quo), allowing us to focus on the effect of the different incentives. This choice is discussed in more detail in the section where we describe our experimental design.

of supporters and opponents), the higher the turnout. Another is the *size effect*: the larger the electorate, the lower the turnout. Finally there is an *underdog effect*: turnout will be higher among supporters of the option with the smallest probability of winning.

Aguiar-Conraria and Magalhães (2010b) showed that in the presence of quora, multiple equilibria arise. In particular, there will always be a no show equilibrium, as a participation rate far below the quorum requirement destroys the individual incentive to participate. A second type of equilibrium involves zero turnout among Opponents, but positive turnout among Supporters. In such equilibria, Supporters have an incentive to vote in order to meet the quorum. Finally, equilibria with positive turnout for both Supporters and Opponents are possible. Generally, these equilibria are either identical to the no quorum equilibrium or involve some lower participation rates among Opponents.

Within the experiment, we set the group size to $n = 9$. As Levine and Palfrey (2007), we consider symmetric benefits: $b = x$.[10] We set $b = x = 600$ and $c = 100$.[11] The probability μ was varied in order to implement two "close" and two "landslide" conditions. Specifically, we implement the following four conditions.

1. (Landslide majority for Change) $= 6/9$: In this case, the expected group sizes are $E(\#supporters, \#opponents) = (6,3)$.
2. (Close majority for Change)
   $\mu = 5/9 => E(\#supporters, \#opponents) = (5,4)$
3. (Close majority for Status Quo)
   $\mu = 4/9 => E(\#supporters, \#opponents) = (4,5)$.
4. (Landslide majority for Status Quo)
   $\mu = 3/9 => E(\#supporters, \#opponents) = (3,6)$

[10] When calibrating the parameter values for $b, x,$ and c, the particular values are irrelevant, the ratios b/c and x/c are what really matters.

[11] These values were chosen because they imply, according to the no-quorum equilibrium predictions, relatively high turnout rates in the absence of a quorum. By choosing a high turnout equilibrium to start with, we are giving a chance that the quorum is not a binding constraint and that they do not distort incentives. Had we started with low turnout rates in the no-quorum case, then quorum busting strategies would be very easy to implement and became the only equilibria (see the first scenario in Table 1). In such case, it would not be surprising to conclude that quora had deleterious effects.

Finally, we consider a participation quorum of 4, and an approval quorum of 3.[12]

Equilibrium predictions for these conditions are derived in the Appendix. The willingness to pay associated with each of the Nash equilibria under each of the above scenarios are presented in Table 1. As the voting cost is uniformly distributed between 0 and 100, these numbers can be interpreted as individual probabilities of casting a vote. Despite the multiplicity of equilibria, a number of general patterns can be discerned from Table 1.

First, we see that the presence of quora is compatible with very low equilibrium levels of turnout, either through zero turnout or through equilibria where Supporters and (especially) Opponents have a much diminished propensity to vote. Second, other equilibria suggest the possibility of an increased participation rate for Supporters, but never at a rate that compensates for the demobilization of Opponents. Thus, we have the following theoretical prediction:

HYPOTHESIS 1: Both types of quora should reduce overall participation rates through a large or very large demobilization effect among Opponents.

Next, we expect

HYPOTHESIS 2: The demobilizing effect among Opponents is stronger with a participation quorum than with an approval quorum.

Note that hypothesis 2 is not immediately obvious in Table 1, but it should be obvious from Figure 1. In the case of an approval quorum, an Opponent voting or not has no influence on meeting the quorum: the incentive to abstain is just a consequence of the voting cost. Under a participation quorum, an Opponent may be hurting herself by

[12] As explained earlier, given that quorum rules changes both the incentive structures and the Status Quo region in Figure 1, we want to make the latter as similar as possible between quora in order to concentrate on the effects of the incentive structure. Choosing $PQ = 4$ and $AQ = 3$ accomplishes that. With 9 electors, there are 55 possible results. Of these, there are only two possible results that have different outcomes. If the Status Quo receives 0 vote and Change receives 3, then, with $AQ = 3$, Change wins and with $PQ = 4$ Status Quo wins. The other result is a 2-2. In that case, with $AQ = 3$, Status Quo wins, while with $PQ = 4$, Status Quo wins only with 50% chances. Except for the trivial case of $AQ = 1$ and $PQ = 1$, in which the two quora are equivalent, the difference between the two Status Quo regions is minimized for these particular choices. For example, had we considered an AQ=2 and the status quo region would be a strict subset of the status quo region with PQ=4, meaning that the approval quorum threshold would undoubtedly be less restrictive than the participation quorum threshold. On the other hand, had we considered AQ=4, and the opposite would happen, with the approval quorum status quo region being a strict superset of the status quo region in the participation quorum case.

helping Change to reach the required quorum. The negative numbers in some of the squares of Figure 1b, which are absent in Figure 1c, reflect just this.

Finally, note that in several of the equilibria with quora, Supporters display a high willingness to pay. Therefore, it is possible that

HYPOTHESIS 3: While, on average, participation rates are lower in the presence of quorum requirements, specifically for Supporters, the turnout rate will be higher.

Table 1: Willingness to pay for different quorum rules, group sizes odds and different profiles

		Opponents	Supporters	Average
No quorum	eq1	88	70	76
Participation Quorum	eq1	0	87	58
	eq2	0	12	8
	eq3	0	0	0
Approval Quorum	eq1	0	73	49
	eq2	0	1	1
	eq3	0	0	0
n = 9, probability of being for change 6/9, participation quorum=4, approval quorum=3				

		Opponents	Supporters	Average
No quorum	eq1	88	82	85
Participation Quorum	eq1	87	82	85
	eq2	33	86	62
	eq3	0	100	56
	eq4	0	17	9
	eq5	0	0	0
Approval Quorum	eq1	85	78	81
	eq2	30	82	59
	eq3	0	84	47
	eq4	0	2	1
	eq5	0	0	0
n = 9, probability of being for change 5/9, participation quorum=4, approval quorum=3				

		Opponents	Supporters	Average
No quorum	eq1	82	88	85
Participation Quorum	eq1	82	89	85
	eq2	24	100	58
	eq3	0	100	44
	eq4	0	25	11
	eq5	0	0	0
Approval Quorum	eq1	77	82	79
	eq2	17	98	53
	eq3	0	99	44
	eq4	0	3	1
	eq5	0	0	0
n = 9, probability of being for change 4/9, participation quorum=4, approval quorum=3				

		Opponents	Supporters	Average
No quorum	eq1	69.9	87.5	75.8
Participation Quorum	eq1	69.8	91.2	76.9
	eq2	21.3	100.0	47.5
	eq3	0.0	100.0	33.3
	eq4	0.0	40.9	13.6
	eq5	0.0	0.0	0.0
Approval Quorum	eq1	60.4	87.0	69.2
	eq2	16.7	100.0	44.5
	eq3	0.0	100.0	33.3
	eq4	0.0	6.1	2.0
	eq5	0.0	0.0	0.0
n = 9, probability of being for change 3/9, participation quorum=4, approval quorum=3				

3. Experimental design

The experiment follows a 3 x 4 design to investigate outcomes under the three quorum conditions within each of the 4 preference scenarios. More specifically, we conducted two different between subject treatments: a participation quorum of 4, and an approval quorum of 3. Within each of these treatments, we conduct an additional *within-subject* treatment comparing each of the quorum rules with a *no quorum*

baseline condition. Finally, within each of these 3 conditions, we vary the probability that an individual voter is a supporter of Change to implement the four preference scenarios (see Table 2).

Table 2: Treatment conditions

Between-Subject	Participation quorum			↔	Approval quorum		
Within-subject	SQ landslide favorite	↔	SQ close favorite	↔	Change close favorite	↔	Change landslide favorite
	No quorum			↔	Quorum		

The experiment was conducted at the experimental laboratory of the Alfred Weber Institute at the University of Heidelberg, Germany. It involved 144 subjects, all of whom were students of the University of Heidelberg.[13] We conducted a total of 8 sessions involving 18 subjects per session. Within each session, subjects were randomly assigned to one of two groups of size 9. These groups remained fixed throughout the experiment, which lasted for 48 rounds.[14] Payoffs in the game were expressed as "points," with each point corresponding to 5 cents.

At the start of each round, subjects were randomly assigned to one of two teams, labeled "A" and "B." Although neutrally labeled, one of these options represented the "Status Quo" while the other represented "Change." Next, subjects were informed about the existence of the quorum rule (if any), and asked to state a *willingness to pay* (WTP), between 0 and 100 points (€5), to cast a vote in favor of their team. Each subject was then randomly assigned a 'voting cost' (VC) uniformly distributed between 0 and 100 points. If the VC was smaller than or equal to the WTP, the subject was said to cast a vote, and the randomly determined VC was subtracted from their earnings in the game. If the VC exceeded the WTP, the subject was said to

[13] Subjects were recruited using the online recruitment system ORSEE (Greiner 2004). The experiment was programmed using the software z-Tree (Fischbacher 2007). Students came from various disciplines (approximately 45% economics, 20% other social sciences, 10% natural sciences, 25% humanities). 45% of our subjects were female.

[14] Subjects were not explicitly informed that they would repeatedly interact with the same set of participants. It is important to note that despite this "fixed matching" scheme, subjects were randomly assigned to the two "teams" at the beginning of each round.

abstain and no cost was subtracted.[15] After all subjects submitted their decisions, the votes actually cast were counted and the winning option determined as per the quorum rule in effect. Subjects belonging to the winning team earned 600 points (€30). At the end of the experiment, participants were paid the average of 10 randomly chosen rounds, in addition to a €5 show up fee.[16] On average, each participant received €21.

Within an experimental session, the probability of favoring Change varied over the course of 48 independent elections (experimental rounds), implementing the four different within-subject treatment conditions. To restate: a landslide majority for the Status Quo (6/3); a close majority for the Status Quo (5/4); a close majority for Change (4/5); and a landslide majority for Change (3/6). The quorum rule also varied, from round to round, between no quorum (NQ) and *either* an approval quorum of 3 (AQ) *or* a participation quorum of 4 (PQ), permitting within-subject comparisons between NQ and either AQ or PQ, as well as between-subject comparisons between AQ and PQ. Note that, in the case of no quorum, the game is perfectly symmetric and, therefore, there is no distinction between the "Status Quo" and "Change." Thus, overall, we have $2 + 4 \times 2 = 10$ treatment conditions.

4. Experimental results

4.1 Regression analysis

We start our analysis by using all the information on all individual actions of the experimental subjects, with the exception of the first 12 rounds, which we disregarded in order to be more confident that the results reflect participants' fuller understanding the rules of the game. We estimate a regression model where WTP ("willingness to pay") is the dependent variable and the explanatory variables are dummies for the

[15] A potential drawback of this (strategy) method is that it *forces* participants to use a cutoff strategy, as predicted by theory. If our goal was to test this aspect of the theory, this would be an inappropriate design choice. However, our aim is to investigate the effects of the quorum rules on participation, and not to test the use of cutoff strategies. Still it is important to note that Levine and Palfrey do find that "to a reasonable approximation individuals followed consistent cutpoint rules" (2007: 152). Therefore we are confident that forcing subjects to use cutoff strategies did not restrict their behavior significantly. See Brandts and Charness (2011) for a more general discussion of the strategy method and how it compares to the direct response method.

[16] This method of payment was chosen as a good compromise between avoiding paying all rounds (introducing wealth effects) and paying only one round (introducing additional risk). See Morton and Wiliams (2010: 399) for a discussion of this methodological choice.

combinations between the different quorum treatments and the values of μ and, for the quorum conditions, whether subjects are Opponents or Supporters. We controlled for individual random effects and for the round number — which is like a time trend with each period corresponding to a round in the game.[17] The time trend was ultimately removed because its coefficient was not statistically significant and the main results were unchanged.

Table 3: Random effects model of the Willingness To Pay to vote

	Coefficient	Std. Error	Wald test q=nq	Wald test aq=nq
1- Constant	25.61	2.62		
2- AQ, Opponent, clear minority	-5.21	3.42	ns	***
3- PQ, Opponent, clear minority	-23.00	3.63	***	
4- AQ, Supporter, clear minority	5.00	4.74	ns	ns
5- PQ, Supporter, clear minority	15.10	4.47	***	
6- No Quorum, borderline minority	22.95	2.45		
7- AQ, Opponent, borderline minority	11.87	4.51	***	***
8- PQ, Opponent, borderline minority	-11.27	3.84	***	
9- AQ, Supporter, borderline minority	23.23	3.77	ns	ns
10- PQ, Supporter, borderline minority	30.39	3.54	**	
11- No Quorum, borderline majority	38.26	3.34		
12- AQ, Opponent, borderline majority	14.24	4.83	***	***
13- PQ, Opponent, borderline majority	-2.55	4.31	***	
14- AQ, Supporter, borderline majority	40.72	3.51	ns	ns
15- PQ, Supporter, borderline majority	40.37	3.58	ns	
16- No Quorum, clear majority	36.84	3.30		
17- AQ, Opponent, clear majority	12.69	4.67	***	***
18- PQ, Opponent, clear majority	-2.74	4.21	***	
19- AQ, Supporter, clear majority	44.53	3.83	***	ns
20- PQ, Supporter, clear majority	44.53	3.68	***	
R-squared	0.29			
Total observations	5183			
PCSE standard errors & covariance (standard errors clustered by individuals)				

***, **, * = null rejected at 1%, 5% and 10%; ns = null not rejected at 10%.

Table 3 shows the estimation results. The constant corresponds to the treatment of Clear Minority under No Quorum. In the second to the last column, we include the

[17] Considering a model with individual fixed effects yields almost identical results, showing that any individual and group effects are very well controlled for, with the random effects model. This is not a surprise, as the laboratory provides precisely the setup in which the error term and the explanatory variables are independent, with all regressors being, by their own nature, purely exogenous.

result of Wald test for the null that the quorum treatment has no effect. In the last column we perform the same test for the difference between the participation quorum and the approval quorum.

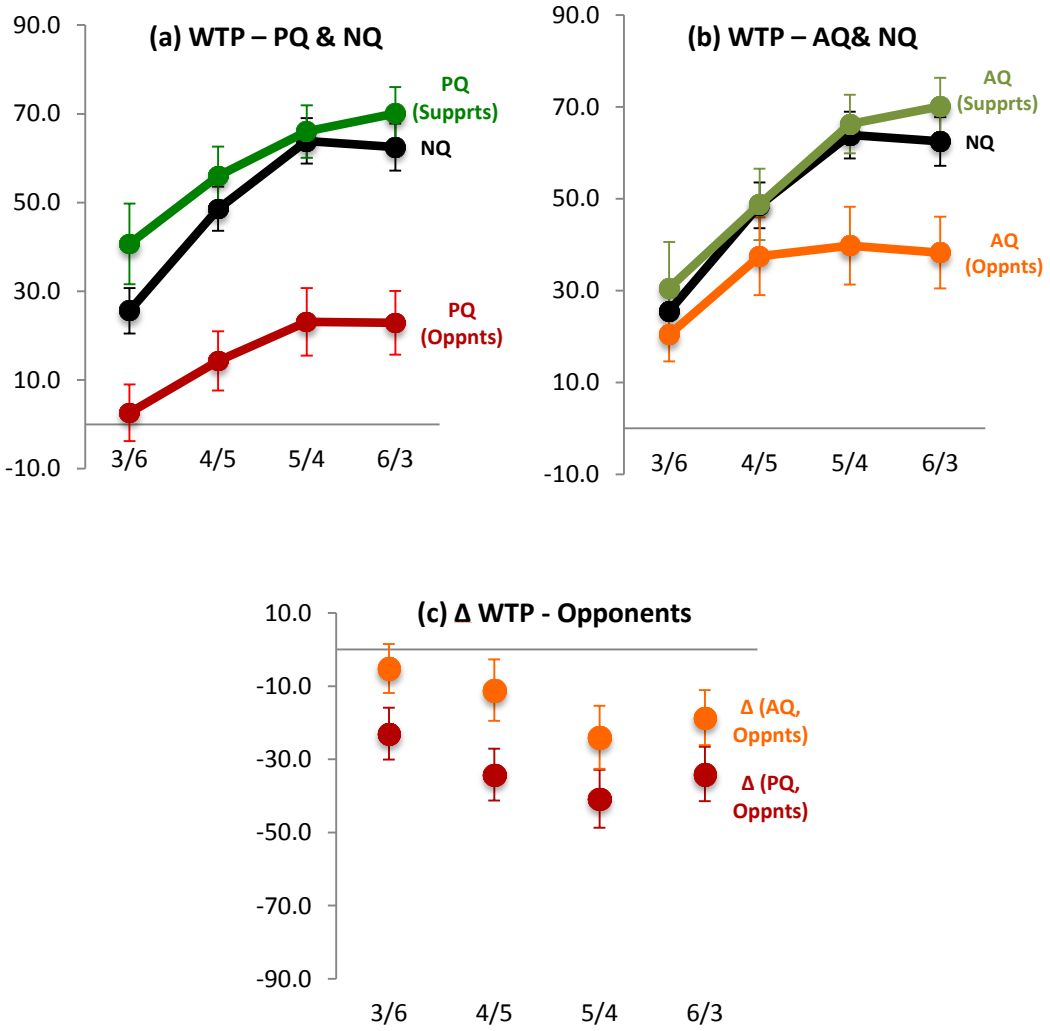


Figure 2: Experimental results. (a) The 'willingness to pay' (WTP) without quorum (NQ) and for Opponents and Supporters under the participation quorum (PQ). (b) WTP without quorum (NQ) and for Opponents and Supporters under the approval quorum (AQ). (c) The effects of quora for Opponents in comparison with the no quorum situation. Error bars denote 95% confidence intervals.

Figure 2 displays the results graphically. Figure 2a show the estimated WTP — i.e. the probability of voting, as voting costs are drawn from a (0,100) uniform distribution — both for the no quorum situation and for Supporters and Opponents under the participation quorum, depending on the (increasing) probability that each other member of the electorate belongs to the their team, from a clear majority against (3/6) to a clear majority in support (6/3). Figure 2b shows the same, but this time replacing the participation quorum with the approval quorum condition. Finally,

Figure 2c focuses on the effects of quora for Opponents in comparison with the No quorum situation.

Overall, as Figures 2a and 2b show, under all quorum conditions, WTP was lowest when subjects expected to be a clear minority, increasing when the election was expected to be close. This is consistent with the predictions of the basic pivotal voter model. However, we can also see that quorum rules also affect the propensity to vote, and in different ways depending on whether subjects are Opponents or Supporters. The results in Table 3 show that Opponents are less likely to vote in the presence of quorum rules than in their absence, a decrease that is statistically significant at 1% (Table 3, third column) in seven out of eight treatments. With the exception of the condition where Opponents expected to be a clear minority under an Approval quorum, the negative marginal effects of quora, seen in Figure 2c, were significant and large, ranging from -11.1 to -40.8 points.

In contrast, for Supporters, there is evidence of an increase in the turnout rates in comparison with the No quorum situation. As Table 3 shows, that evidence is most compelling under the participation quorum and when Supporters expect to be a clear majority. In sum, quora affect Opponents and Supporters in different ways: there is strong and unambiguous evidence that that they decrease the turnout of those who oppose the measure changing the Status Quo, and some evidence that it increases Supporters' turnout. Furthermore, as Figures 2a) and 2b) clearly suggest, the increased WTP for Supporters only partially offsets the decrease among Opponents. The result that quora decrease overall turnout: overall participation ended up being highest in the No Quorum condition (53.8, ± 4.0, 95% CI), lowest under the Participation Quorum condition (39.9, ± 4.1, 95% CI), and intermediate under the Approval Quorum condition (47.0, ± 4.5, 95% CI).

If quora affect turnout, which type of quorum has the largest effects? In Table 3, last column, we test the difference between the effects of participation and approval quora on turnout. For Supporters, the results are not definitive, with the differences not being statistically significant at conventional levels. However, for Opponents, the demobilizing effect is always significantly stronger in the case of the participation quorum. These differences in effect size are always significant at 1% and reach at least 14 percentage points. The same is visible in Figure 2c), showing demobilization

effects of the participation quorum that are always larger than under approval quora and under all values of μ.

4.2 Non-Parametric Analysis

The previous analysis can be complemented by looking at non-parametric tests for the average willingness to pay. As we explained before, eight groups were subjected to the "No quorum" and "Approval quorum" treatments and another eight groups were subjected to the "No quorum" and "Participation quorum" treatments. So, to compare effects of a quorum treatment with a no quorum treatment, we rely on within-subject test, to be more precise we use the Wilcoxon signed-rank test (we use the $signrank$ function of Matlab). To compare the two different quorum types, we rely on the Mann-Whitney U test for independent samples, because in this case we have eight groups that are subject to the "Approval quorum" treatment and eight other groups that are subject to the "Participation quorum" treatment, (we use the $ranksum$ function of Matlab). Table 4 shows the results.

In the first column, just for reference, we have the average willingness to pay that corresponds to each treatment. In the second column, we present the p-value of the Wilcoxon signed-rank test for the null that means are equal under quorum and no quorum. Finally, in the third column, we show the p-value associated with the Mann-Whitney U test, for the null that the means are the same for both quorum types. The results basically confirm the results we obtained in Table 3, when we compare the quorum with no quorum situation. However, when one compares the effects of the two different quorum rules, most of the differences are no longer statistically significant. The fact that these differences are so strongly significant in Table 3, suggests that not controlling for group effects may have severe consequences.

Table 4: Non parametric analysis

	Average Willingness to Pay	Wilcoxon test (p-value)	Mann-Whitney U test (p-value)
1- No Quorum, clear minority	24.4 ; 25.6 [a]		
2- AQ, Opponent, clear minority	15.5	0.078	0.152
3- PQ, Opponent, clear minority	8.3	0.008	
4- AQ, Supporter, clear minority	28.9	0.25	0.105
5- PQ, Supporter, clear minority	43.8	0.016	
6- No Quorum, borderline minority	47.9 ; 50.7 [a]		
7- AQ, Opponent, borderline minority	35.6	0.078	0.049
8- PQ, Opponent, borderline minority	18.0	0.008	
9- AQ, Supporter, borderline minority	45.5	0.383	0.328
10- PQ, Supporter, borderline minority	56.6	0.109	
11- No Quorum, borderline majority	60.9 ; 65.5 [a]		
12- AQ, Opponent, borderline majority	39.3	0.008	0.279
13- PQ, Opponent, borderline majority	26.5	0.008	
14- AQ, Supporter, borderline majority	64.3	0.195	0.574
15- PQ, Supporter, borderline majority	66.7	0.461	
16- No Quorum, clear majority	59.1 ; 66.4 [a]		
17- AQ, Opponent, clear majority	36.2	0.008	0.195
18- PQ, Opponent, clear majority	24.4	0.008	
19- AQ, Supporter, clear majority	69.6	0.008	1.000
20- PQ, Supporter, clear majority	70.3	0.109	

[a] The first value corresponds to the mean of the 'no quorum' treatment in the groups that also played the approval quorum. The second value corresponds to the mean in the groups that played the 'participation quorum' game.

4.3 Quorum-busting strategies

Discussing the effects of quorum rules, particularly in what concerns referenda and initiatives, leads us almost inevitably to discussing the possibility of boycotts, i.e. electors who decide to abstain with the firm objective of helping the quorum not to be met. Such outcome has been described in historical reports of full-fledged boycotts of direct democracy initiatives on the part of supporters of the Status Quo under participation quora, including the cases of Italian abrogative referenda (Uleri 2002; Kaufmann et al. 2008), the two referenda held under the German Weimar Republic (West 1985; Suksi 2002), and several other cases (International IDEA 2008).

In our setup, that basically corresponds to choosing a willingness to pay equal to zero. To describe the impact of the quorum restrictions on the probability of boycotting an election in our experimental setup, we created a dummy variable, call it *Boycott*, that

takes the value 1 if WTP=0 and zero otherwise. Then, we estimate a binary choice model, with the help of a random effects probit model. We also included a time trend, i.e., the round number.

Table 5: Random effects Probit on boycotting elections

	Coefficient	Std. Error	Probability of Boycott	Marginal effects Quorum vs NQ	Marginal effects PQ vs AQ
1- Constant	-0.974	0.178	24.5		
2- AQ, conservative, clear minority	0.466	0.181	41.2	16.6**	42.6***
3- PQ, conservative, clear minority	1.674	0.189	83.8	59.2***	
4- AQ, changer, clear minority	-0.229	0.186	17.9	-6.6	0
5- PQ, changer, clear minority	-0.227	0.181	18.0	-6.6	
6- No Quorum, borderline minority	-1.012	0.137	4.5		
7- AQ, conservative, borderline	-0.059	0.162	22.7	18.3***	50.9***
8- PQ, conservative, borderline	1.322	0.164	73.7	69.2***	
9- AQ, changer, borderline minority	-1.096	0.166	3.7	-0.7	1.7
10- PQ, changer, borderline minority	-0.920	0.162	5.4	0.9	
11- No Quorum, borderline majority	-1.789	0.155	0.7		
12- AQ, conservative, borderline	-0.076	0.158	22.2	21.6***	38.7***
13- PQ, conservative, borderline	0.967	0.157	60.9	60.3***	
14- AQ, changer,borderline majority	-1.653	0.184	1.0	0.3	1.2
15- PQ, changer, borderline majority	-1.343	0.171	2.1	1.4*	
16- No Quorum, clear majority	-1.291	0.131	2.4		
17- AQ, conservative, clear majority	0.020	0.141	25.2	22.8***	34.2***
18- PQ, conservative, clear majority	0.926	0.140	59.4	57***	
19- AQ, changer, clear majority	-1.555	0.175	1.2	-1.1	-0.4
20- PQ, changer, clear majority	-1.696	0.187	0.9	-1.5**	
Round	0.009	0.003			
Total observations		5183			
Standard Errors clustered by individuals					

***, **, * = null rejected at 1%, 5% and 10%

Table 5 shows our results and Figure 3 provides a graphical illustration of the most significant findings. As before, the data includes every individual observation, except the data corresponding to the first 12 rounds. In the first two columns, we have the typical information: information on the estimated coefficients and standard errors for the different treatments. In the third column, we convert that information into the probability of boycotting and, in the last two columns, we show the marginal effects. By marginal effects we mean the impact on the probability of boycotting an election from changing from "no quorum treatment" to a "quorum treatment" (in the second to

the last column), and on the probability of boycotting an election from changing an "approval quorum treatment" to a "participation quorum treatment" (last column).[18]

While neither quorum significantly impacts the probability that a Supporter boycotts, both make it significantly more likely that an Opponent does so. For every treatment, the likelihood of Opponents boycotting an election increases significantly.

The approval quorum raises this probability by a value between 16 and 23 percentage points. With one exception, the differences in the impacts of the different quorum rules are statistically significant at 1%. The exception is when an Opponent expects to be in clear minority. In that case, the marginal effect is significant only at 5%.

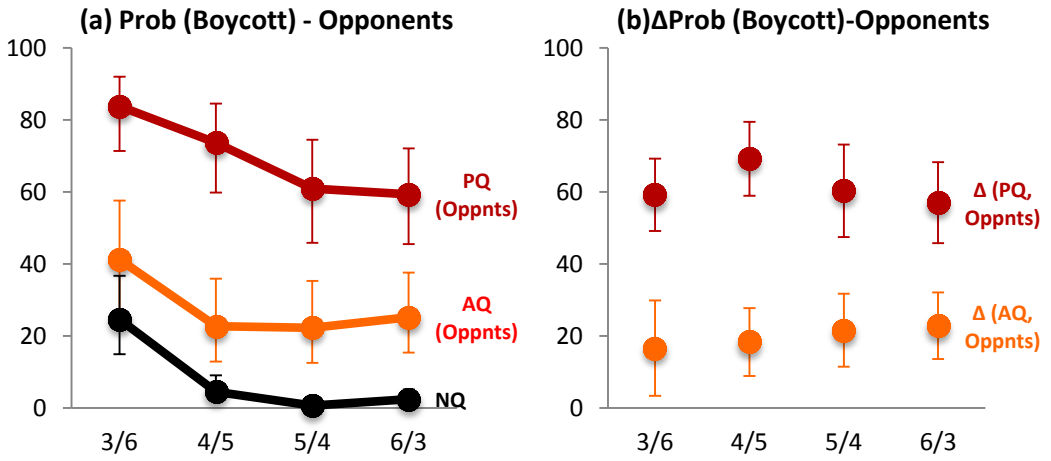


Figure 3: Experimental results. (a) The probability that an elector boycotts the election without quorum (NQ) and, for Opponents, the participation quorum (PQ) and the participation quorum (AQ). (b) The marginal effects of quora for Opponents in comparison with the no quorum situation. Error bars denote 95% confidence intervals.

The impact of the participation quorum is dramatically stronger: the increase is at least of 57 percentage points and can reach almost 70 points. The marginal effect on the probability that an Opponent boycotts an election is always significant at 1%, both when compared with the no quorum and with the approval quorum treatments.

[18] To compute the probability of boycott and the marginal effects, we considered Round=30.5 (the mean value).

5. Conclusions

Several studies have examined the consequences of institutional rules regulating direct democracy, including variables such as "institutional openness" and agenda-setting rules, on aspects such as the frequency with which referendums or initiatives take place, the amount of policy change, and the congruence of policy with citizen preferences (Hug and Tsebelis 2002; Hug 2004; Eder at al. 2009). However, studies of the determinants of turnout in direct democracy settings are rare, tend to focus on aspects such as the closeness of the election or the consequences of ballot issues, and have relied mostly on observational data (Filer and Kenny 1980; Matsusaka 1993; Coate and Conlin 2004; Coate et al. 2008). In this paper, motivated by a widespread aspect of direct democracy design – the adoption of quorum rules – we examine its consequences on turnout using a laboratory experiment. Furthermore, although our language is the one of "elections", quorum rules are also used in a broader variety of contexts, and the conclusions may travel to settings where similar rules prevail.

We found that the main predictions of the pivotal voter model, extended to accommodate quorum rules, were confirmed. Overall participation rates were lower in the presence of quorums, even if, in some situations, the turnout among Supporters of measures changing the Status Quo slightly increased — a finding that was not present in previous studies. There is also evidence that the demobilization impact caused by quora among those who oppose changing the Status Quo was strongest in the case of participation quora. An impressive result, which is in agreement with our model predictions, was that the participation quorum increased the probability of Opponents boycotting the election by 57 to 70 percentage points. The same sort of effect, although not nearly as dramatic, was also present, and highly statistically significant, for the approval quorum treatment

Several potential awkward consequences follow from this. Designed to protect the Status Quo, quora stimulate the participation of Supporters and depress that of Opponents. In other words, when quora are nevertheless met, they end up having favored Change. If, in turn, Opponents engage in boycotts that happen to be successful, huge majorities of expressed preferences in favor of Change will nevertheless fail to pass it. Furthermore, in real world conditions, full boycotts on the part of Opponents, which we showed to be massively increased by participation

quora, make the preferences of those who vote (Supporters) common knowledge, endangering the secrecy of the vote.[19] Finally, quora decrease overall levels of turnout, potentially affecting, in real world conditions, the perceived "legitimacy" of results.

Future experiments may test the robustness of our results to a number of different extensions. One such extension could allow for communication among subjects, while keeping voting anonymous. This way, they may coordinate strategies to select a particular equilibrium. Another potentially interesting experiment will be to allow for negative voting costs, to capture the possibility of expressive voting and the idea of voting by civic duty. According to Aguiar-Conraia and Magalhães (2010b) this extension may help to further differentiate the approval from the participation quorum. Finally, allowing for different intensity in preferences to test the effect of quorums on the behavior of active minorities may also lead to relevant results.

[19] Regarding this topic, Aguiar-Conraria and Magalhães (2010b, p. 52) cite a woman complaining about the lack of anonymity in the 2005 Italian referendum on the abolition of restrictions to *in vitro* fertilization and embryo research in Italy: 'In Capranica, a town of 6000 people, voting will be difficult. The local church organized groups of volunteers to intimidate the town's people to prevent them from voting. My town is not unique. There are several municipalities where anonymity does not exist. People are controlled, their votes, their actions and whereabouts. The degree of distress, especially among women, is enormous.' In this particular referendum in Italy, the Catholic Church called for a boycott. Almost 90% of the voters voted for change, but turnout as only slightly above 25% and status quo prevailed.

Appendix 1: The mathematics of the pivotal voter model with quorum requirements

Assume that if 'Yes' wins the election, Supporters obtain a benefit b. Opponents have a benefit of x. Assume also that there are 9 electors ($i = 1, \dots, 9$) and that each faces a cost of voting given by c_i, where c_i is the realization of a uniformly distributed random variable, $c_i \sim U[0,100]$. Each voter knows her own costs, but only knows the cost distribution of the other voters. Also, each elector knows her own type and knows the probability that each other individual elector favors the proposal. A strategy is a function that specifies if elector i votes or abstains for each possible realization of c_i. A symmetric Bayesian-Nash equilibrium imply that all members of a group follow the same strategy. An elector will vote if the voting cost is below some threshold. Let γ_s and γ_o be those cut-off values for supporters of Change and opponents, respectively. Taking as given the strategies of the other players, let $\rho(v_o, v_s)$ be the probability that elector *i* attaches that among the other electors v_o vote 'No' and v_s vote 'Yes', i.e. the probability that elector *i* to the square in Figure 1 with coordinates (v_o, v_s).[20]

Collecting the squares in Figure 1 in which a Supporter is pivotal, one can easily compute the expected benefit of voting for a Supporter. She will vote if the expected benefit exceeds the cost of voting. In equilibrium, this means that

$$\begin{cases} \left[\sum_{v=0}^{4} \frac{\rho(v,v)}{2} + \sum_{v=0}^{3} \frac{\rho(v+1,v)}{2}\right] b = \gamma_s, \quad if\ there\ is\ no\ quorum, Fig\ 1a \\ \left[\sum_{v=2}^{4} \frac{\rho(v,v)}{2} + \sum_{v=1}^{3} \frac{\rho(v+1,v)}{2} + \rho(1,2) + \rho(0,3)\right] b = \gamma_s, \quad if\ there\ is\ a\ participation\ quorum, Fig\ 1b \\ \left[\sum_{v=3}^{4} \frac{\rho(v,v)}{2} + \sum_{v=2}^{3} \frac{\rho(v+1,v)}{2} + \sum_{v=0}^{2} \rho(v,2)\right] b = \gamma_s, \quad if\ there\ is\ an\ approval\ quorum, Fig\ 1c \end{cases}$$

For an Opponent, the expected benefit of voting and the equilibrium conditions are given by:

$$\begin{cases} \left[\sum_{v=0}^{4} \frac{\rho(v,v)}{2} + \sum_{v=0}^{3} \frac{\rho(v,v+1)}{2}\right] x = \gamma_o, \quad if\ there\ is\ no\ quorum, Fig\ 1a \\ \left[\sum_{v=2}^{4} \frac{\rho(v,v)}{2} + \sum_{v=2}^{3} \frac{\rho(v+1,v)}{2} - \frac{\rho(1,2)}{2} - \rho(0,3)\right] x = \gamma_o, \quad if\ there\ is\ a\ participation\ quorum, Fig\ 1b \\ \left[\sum_{v=3}^{4} \frac{\rho(v,v)}{2} + \sum_{v=2}^{3} \frac{\rho(v,v+1)}{2}\right] x = \gamma_o, \quad if\ there\ is\ an\ approval\ quorum, Fig\ 1c \end{cases}$$

[20] This is an obvious abuse of notation, as ρ(.) depends on the strategies of the other players, which also depend on the existing quorum requirement. We refer the reader to Aguiar-Conraria and Magalhães (2010b) for a rigorous derivation of the model.

Note that in the participation quorum case, an Opponent may be pivotal in an undesirable way if her vote is decisive to meet the quorum, hence the negative signs in the second equation.

For each quorum treatment, we have two equations and two unknowns. To find the equilibria numerically, existence of solutions is not a problem, but there are no general uniqueness results. However, given that our problem is only two-dimensional and bounded, one can perform a detailed grid search to look for several equilibria. Only in the case of no quorum, we found unique equilibria.

Appendix 2: Experiment instructions

The following instructions were displayed (in German) on screen when subjects entered the laboratory:

Instructions

Thank you for participating in this experiment. Please read the following instructions carefully. If you have a question, silently raise your hand.

General Rules

- This experiment will last for approximately 90 minutes. During this time, you should not leave your place.
- Please turn off and put away your mobile phone. Starting now, there should be nothing on your table. (A drink is permitted.)
- Please remain quiet during the experiment, and do not speak to other participants.
- At the end of the experiment, stay at your sear until your number is called. You will then be paid and you will sign a receipt.
- You will receive further instructions after all participants have taken their seats."

After all subjects had taken their seats, an announcement was made that instructions for the experiment would be displayed. Subjects were told that the instructions cover six screens and that they would be able to navigate back and forth as often as they wished. The following screens were then displayed in sequence, with "forward" and "back" buttons displayed at the bottom of the screen.

Screen 1

Rounds, Points, Payment

- You will receive a 5 EUR participation fee for participating. During the experiment, you may attain either a higher or lower payment.
- Your payment will depend on your decisions and those of other participants.
- The experiment consists of 48 rounds, each of which is independent of the others. In every round, you will have the opportunity to earn points. At the end of the experiment, 10 rounds will be randomly chosen for payment.
- Your payment will depend on your average number of points in the randomly chosen rounds. Points are exchanged for payment at the ratio

  1 point = 0.05 EUR

- If you should earn a negative number of points during the experiment, the corresponding amount will be subtracted from your show-up fee. However, your payment will be positive in all cases.

Screen 2

What happens during a round?

- At the start of each round, every participant draws a **ball** from a (virtual) urn. The ball is marked either **"A" or "B"**. (Additional details regarding the composition of the urn will follow below.)
- After this, you and 8 other participants (i.e. a **group of 9 participants**) will make a choice.

- The members of the group choose between two **options "A" and "B"** by way of voting. (Details regarding the voting rules will follow below.)
- If the option chosen by your group ("A" or "B") matches the ball you have drawn ("A" of "B"), you will receive **600 points** in this round.

(Remember: 1 point = 0.05 EUR. Thus 600 points = 30 EUR)

Screen 3

Details: Urn and Balls

- Every participant draws a ball from his or her **own urn**, **independently** of other participants.
- The urn contains **9 balls**. Some are marked **"A"**, the others are marked **"B"**. The composition of the urn will vary from one round to the next.
- You will be informed about the number of balls marked "A" and "B" at the beginning of each round.
- Within a given round, the number of balls "A" and "B" are the **same for all participants**. The chances of drawing a ball marked "A" or a ball marked "B" are therefore the same for all participants.

Example: Suppose that the urn contains 4 balls marked "A" and 5 balls marked "B".

- In this example, the probability that you will draw a ball marked "A" is 4/9. The probability that you will draw a ball marked "B" is 5/9. The same is true for all other participants.
- In this example, it will not necessarily be the case that 4 participants will draw a ball marked "A" and 5 participants will draw a ball marked "B". For example, it is possible (though unlikely) that all participants will draw a ball marked "A".

Screen 4

Details: Voting

- In each round, every participant will decide whether he wishes to **vote** or whether he wishes **not to vote**.
- If the participant chooses to vote, a certain number of points will be subtracted from his total in that round. We will refer to the number of points subtracted as his **voting cost**.
- Your voting costs lie **between 0 and 100 points.** They will be **randomly determined** for each participant at the beginning of every round. Every number between 0 and 100 points is equally likely. (Remember: 1 point = 0.05 EUR. Therefore 100 points = 5 EUR.)
- Every participant is assigned his own voting cost in each round. In general, these costs will therefore differ between participants.
- If a participant decides to **vote**, then a vote for the **option corresponding to his ball** is automatically counted.

Example: Suppose you draw a ball marked "A". If you choose to vote, then one vote for option "A" is automatically counted.

Screen 5

Details: Your Decision

- In order to better understand your decision (vote or not vote), we will proceed as follows.
- In each round, we will ask you to state **how much you are willing to pay, at most**, in order to cast a vote in this round.

- Important: We will ask this question **before we inform you of your actual voting cost in the round**. (However you will know the composition of the urn, the ball you have drawn, and the voting rule that is in effect.)
- If your voting cost is **smaller than or equal to** your stated willingness to pay, you will cast a vote and "pay" the voting cost (**not** your stated willingness to pay).
- If your voting cost is **larger** than your stated willingness to pay, you will not cast a vote.
- **Your statement has no influence on your actual voting cost**. This cost is randomly determined already before you make your decision.

Screen 6

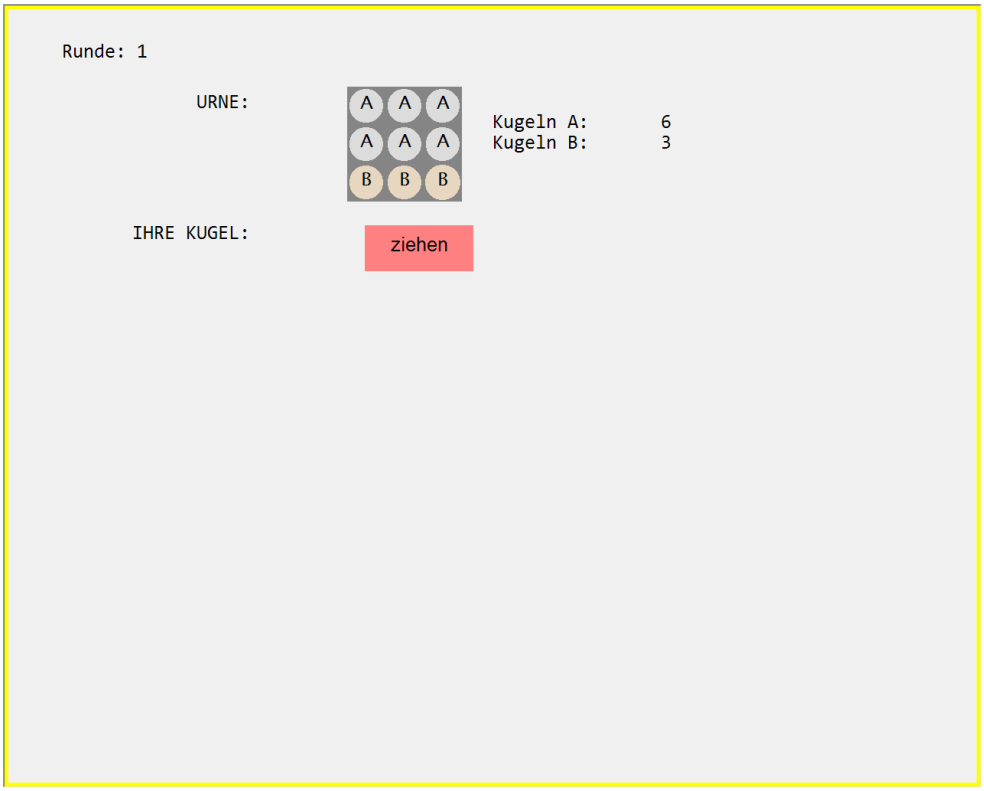
Details: Voting Rule

- After all participants have decided (as described above) to vote or not to vote, the votes cast are counted.
- Recall that when a participant votes, a vote for the option corresponding to his ball is automatically counted.
- **In principle:** The option which receives the **most votes** is chosen. In case of a **tie**, a random choice is made (50/50).
- **However:** In addition, in **some rounds**, there will be a so-called **quorum rule**. This rule states that one of the two options (A or B) will be automatically chosen if **fewer than 4 votes** are cast [fewer than 3 votes are cast for the other option].

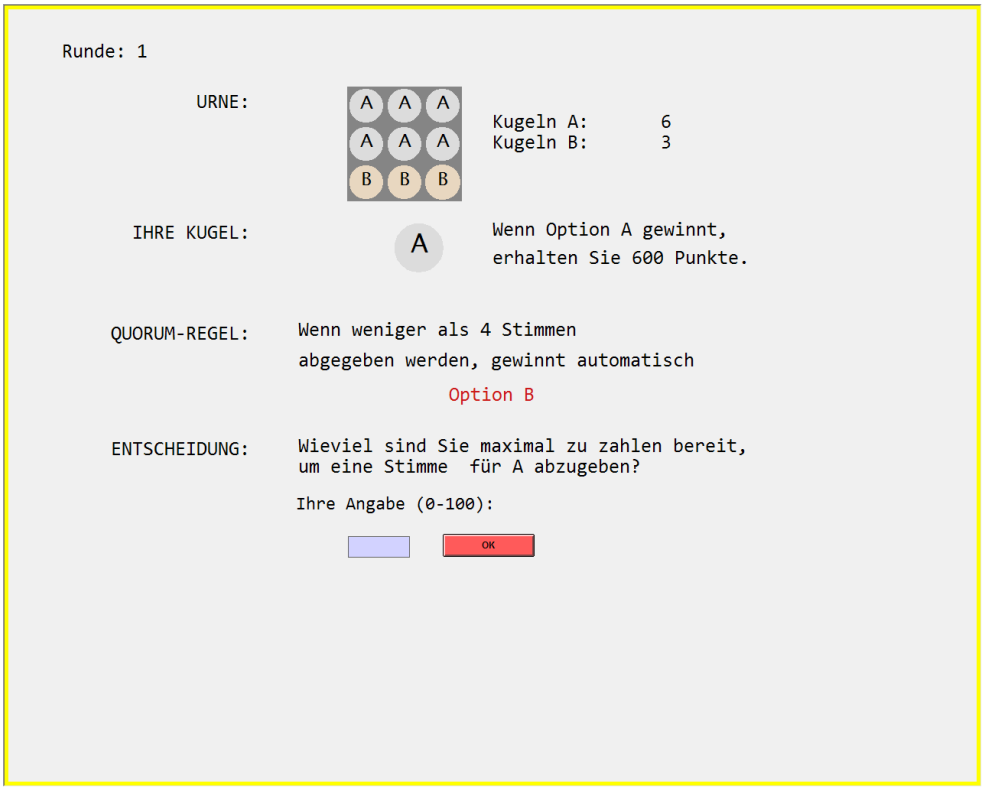
Example: Suppose the quorum rule states: "If fewer than 4 votes [3 votes for option B] are cast, option A will automatically win." Then if, for example, 2 votes for option B and one vote for option A are cast, option A will win **despite** that B has a majority of the votes.

- You will be informed prior to making your decision about whether a quorum rule is in effect, and which option will win if the quorum is not met.
- **Note:** If the option corresponding to your ball wins, you will receive 600 points, even if you have not cast a vote.

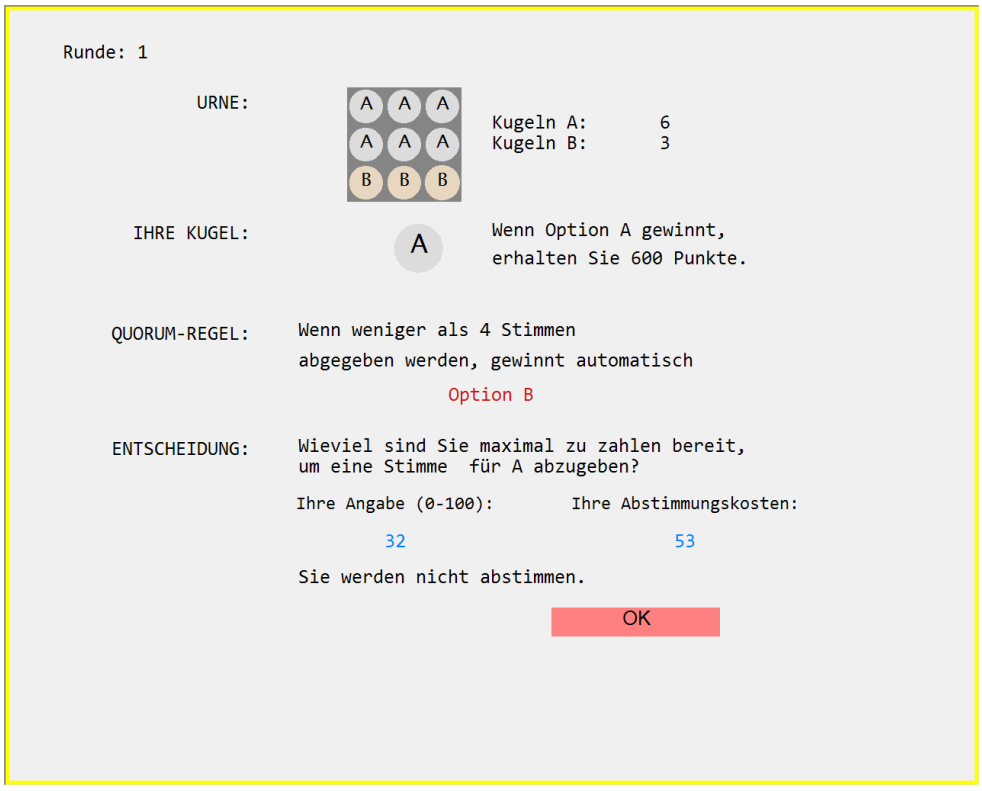
Screenshot 1: drawing a ball



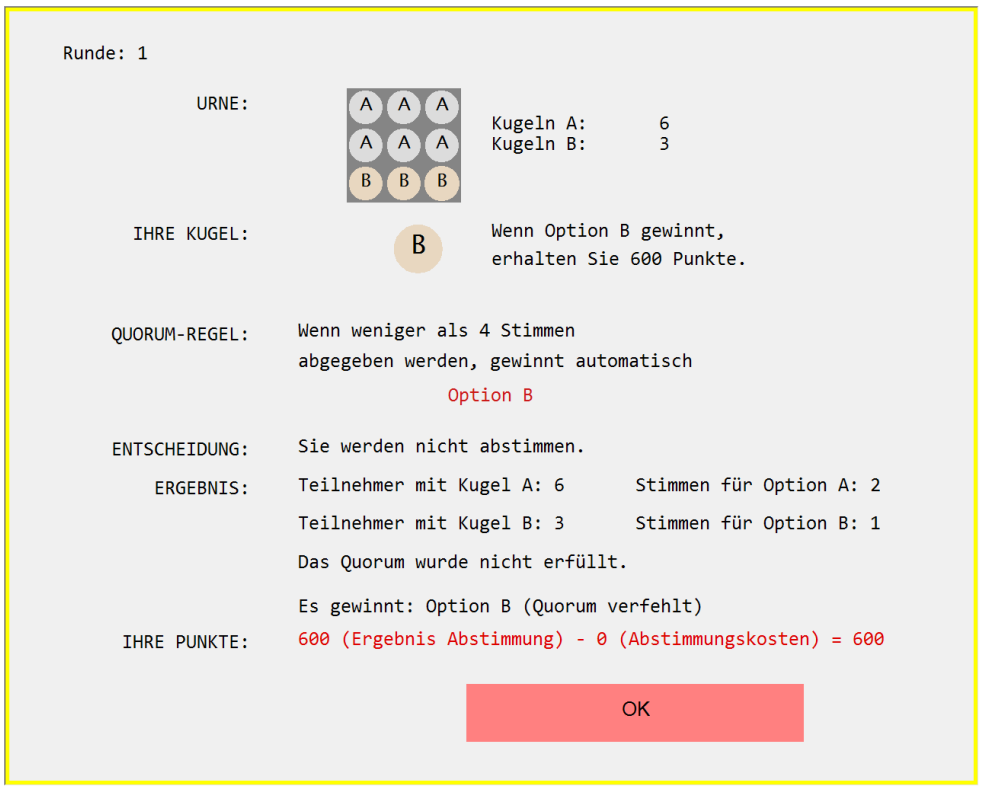
Screenshot 2: Input willingness to pay



Screenshot 3: Feedback after cost draw



Screenshot 4: Feedback at end of round



References

Aguiar-Conraria, L., & Magalhães, P. C. (2010a). Referendum design, quorum rules and turnout. *Public Choice*, *144*(1), 63-81.

Aguiar-Conraria, L., & Magalhães, P. C. (2010b). How quorum rules distort referendum outcomes: Evidence from a pivotal voter model. *European Journal of Political Economy*, *26*(4), 541-557.

Altman, D. (2011). *Direct Democracy Worldwide*. Cambridge Univ. Press

Battaglini, M., Morton, R. B., & Palfrey, T. R. (2010). The swing voter's curse in the laboratory. *The Review of Economic Studies*, *77*(1), 61-89.

Blais, A. (2000). *To vote or not to vote?* Pittsburgh: Univ of Pittsburgh Press.

Börgers, T., 2004. Costly voting. *American Economic Review* 94(1), 57–66.

Brandts, J., & Charness, G. (2011). The strategy versus the direct-response method: a first survey of experimental comparisons. *Experimental Economics*, *14*(3), 375-398.

Coate, S., Conlin, M. & Moro, A. (2008). The performance of pivotal-voter models in small-scale elections: evidence from Texas liquor referenda. *Journal of Public Economics* 92(3-4), 582–596.

Coate, S. & Conlin, M. 2004. A group rule–utilitarian approach to voter turnout: theory and evidence. *American Economic Review* 94 (5), 1476–1504.

Côrte-Real, P., Pereira, P.T. (2004). The voter who wasn't there: referenda, representation and abstention. *Social Choice and Welfare* 22(2), 349–369.

Duffy, J., Tavits, M. (2008). Beliefs and voting decisions: A test of the pivotal voter model. *American Journal of Political Science*, 52 (3), 603-618.

Eder, Christina, Adrian Vatter, and Markus Freitag (2009). Institutional design and the use of direct democracy: Evidence from the German Länder. *West European Politics*, 32 (3), 611-633.

Filer, J. E., & Kenny, L. W. (1980). Voter turnout and the benefits of voting. *Public Choice*, 35(5), 575-585.

Fischbacher, U. (2007). z-Tree: Zurich Toolbox for Ready-Made Economic Experiments. *Experimental Economics*, 10, 171–178.

Groβer, J., & Schram, A. (2006). Neighborhood information exchange and voter participation: an experimental study. *American Political Science Review*, *100*(2), 235-248.

Groβer, J., & Schram, A. (2010). Public opinion polls, voter turnout, and welfare: An experimental study. *American Journal of Political Science*, *54*(3), 700-717.

Greiner, B. (2004). An Online Recruitment System for Economic Experiments. In *Forschung und Wissenschaftliches Rechnen 2003*, ed. By K.Kremer and V.Macho. GWDG Bericht 63. Gesellschaft für Wissenschaftliche Datenverarbeitung Göttingen : Datenverarbeitung, 79–93.

Herrera, H., Mattozzi, A. (2010a). Quorum and turnout in referenda. *Journal of the European Economic Association* 8(4), 838-871.

Hizen, Y., & Shinmyo, M. (2011). Imposing a turnout threshold in referendums. *Public Choice*, *148*(3), 491-503.

Hug, S. (2004). Occurrence and policy consequences of referendums. A theoretical model and empirical evidence. *Journal of Theoretical Politics*, 16(3), 321-356.

Hug, S., & Tsebelis, G. (2002). Veto players and referendums around the world. *Journal of Theoretical Politics*, 14(4), 465-515.

International IDEA, 2008. *Direct Democracy: The International IDEA Handbook*. International Institute for Democracy and Electoral Assistance, Stockholm.

Kaufmann, B., Büchi, R., & Braun, N. (2008). *Guidebook to Direct Democracy in Switzerland and Beyond. Initiative & Referendum Institute Europe*. Marburg.
Laruelle, A., & Valenciano, F. (2012). Majorities with a quorum. *Journal of Theoretical Politics*, 23(2), 241-259.
Laruelle, A., & Valenciano, F. (2012). Quaternary dichotomous voting rules. *Social Choice and Welfare*, 38(3), 431-454
LeDuc, Lawrence. 2003. *The Politics of Direct Democracy: Referendums in Global Perspective*. Toronto: Broadview Press.
Levine, D. K., & Palfrey, T. R. (2007). The paradox of voter participation? A laboratory study. *American Political Science Review, 101(*1), 143-158.
Maniquet, F., & Morelli, M. (2011). Approval quorums dominate participation quorums. Working paper.
Matsusaka, J. G. (1993). Election closeness and voter turnout: Evidence from California ballot propositions. *Public Choice,* 76(4), 313-334.
Matsusaka, J.G., 2005. Direct democracy works. *The Journal of Economic Perspectives*, 19, 185–206.
Morton, R. B., & Tyran, J. R. (2011). Let the experts decide? Asymmetric information, abstention, and coordination in standing committees. *Games and Economic Behavior*, 72(2), 485-509.
Morton, R. B. & Williams, K. C. (2010) *Experimental Political Science and the Study of Causality,*Cambridge Univ. Press, New York.
Myerson, R. B. (2000). Large poisson games. *Journal of Economic Theory*, *94*(1), 7-45.
Palfrey, T. R. (2009). Laboratory experiments in political economy. *Annual Review of Political Science*, *12*, 379-388.
Palfrey, T. & Rosenthal, H. (1985). Voter participation and strategic uncertainty. *American Political Science Review*, 79(1): 62-78.
Qvortrup, M. (2005). *A Comparative Study of Referendums*. Manchester University Press, Manchester UK.
Rasch, B. E. (1995). Parliamentary Voting Procedures. In Döring, H. (Ed.). *Parliaments and majority rule in Western Europe*. Frankfurt: Campus.
Schiller, T. (2011). *Local Direct Democracy in Europe*. Wiesbaden: VS Verlag.
Schram, A., & Sonnemans, J. (1996). Voter turnout as a participation game: an experimental investigation. *International Journal of Game Theory*, *25*(3), 385-406.
Squire, P. (2006). Historical evolution of legislatures in the United States. *Annual Review of Political Science*, *9*, 19-44.
Suksi, M. (1993). *Bringing in the People: A Comparison of the Constitutional forms and Practices of the Referendum*. Martinus Nijhoff Publishers, Dordrecht.
Uleri, P.V. (2002). On referendum voting in Italy: yes, no or non-vote? How Italian parties learned to control referendums. *European Journal of Political Research* 41(6), 863–883.
Venice Commission. (2007). Code of good practice on referendums. *Document CDL-AD(2007)008*. Available at http://www.venice.coe.int/docs/2007/CDL-AD(2007)008-e.asp.
West, F.C. (1985). *A Crisis of the Weimar Republic: A Study of the German Referendum of 20 June 1926*. American Philosophical Society, Philadelphia PA.
Williams, J. B. (2006). How to Survive a Terrorist Attack: The Constitution's Majority Quorum Requirement and the Continuity of Congress. *William & Mary Law Review*, *48*, 1025.

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