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Rasmus Wiese
Richard Jong-A-Pin

CESifo Working Paper No. 5765
Category 2: Public Choice
February 2016

ISSN 2364-1428

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Abstract

We test the theory of expressive voting in relation to political ideology in a laboratory experiment. After deriving our hypotheses from a decision theoretic model, we examine voting decisions in an experiment in which we use the size of the electorate as the treatment variable. Using a Heckman selection model that includes both the electoral participation decision and voting choice decision, we find mixed results for the expressive voting hypothesis. In line with expressive voting, our findings suggest that non-ideological voters are more likely to abstain from voting than ideological voters – especially when the electorate grows large. Concerning the voting choice decision between an equal but inefficient, and an unequal but efficient income distribution the evidence for expressive voting is mixed. We do find that voters with socialist (left wing) preferences behave expressively, but we do not find this effect for voters with capitalist preferences.

JEL-Codes: C910, D720.

Rasmus Wiese
Faculty of Economics and Business
University of Groningen
The Netherlands - 9747 AE Groningen
r.h.t.wiese@rug.nl

Richard Jong-A-Pin
Faculty of Economics and Business
University of Groningen
The Netherlands - 9747 AE Groningen
r.m.jong.a.pin@rug.nl

This version: 21 December 2015

1 Introduction

One of the prominent explanations for voter turnout is the theory of expressive voting, which has spurred a series of models (Brennan and Buchanan 1984, Brennan and Lomansky 1993, Scheussler 2000, Feddersen and Sandroni 2006a; 2006b, Feddersen et al. 2009).[1] Hillman (2010) defines expressive behaviour as "the self-interested quest for utility through acts and declarations that confirm a person's identity."[2] The theory of expressive voting assumes that voters derive utility both from participating in the voting and from voting in favour of the outcome that is morally appealing. By doing so, it provides an explanation for Tullock's "charity of the uncharitable" phenomenon that individuals will act entirely selfish if their decision can determine the outcome of some exchange, but may act charitable in situations where individual votes are unlikely to change the outcome (Tullock 1971). The introduction of expressive utility resolves the Downsian voting paradox (Downs 1957), because unlike monetary and non-monetary instrumental utility, expressive utility is not affected by the probability that a vote is pivotal and, therefore, explains a positive turnout in large-scale elections.

Testing the expressive voting theory, however, has turned out to be troublesome. The confidentiality of elections makes the relation between individuals' preferences and voting decisions hard to uncover if one relies on survey data. Individuals may report that votes are based on moral beliefs, while in fact, they have voted to maximize monetary income. Similarly, asking voters how they would choose when confronted with a hypothetical voting decision is also prone to induce error, since the choice between an expressively preferred option and an economically preferred one cannot reveal true preferences as long as the opportunity costs of choosing expressively are negligible (List and Gallet 2001).

As a solution to the measurement problem, several studies test the theory of expressive voting in an experimental set up in which a moral choice is contrasted with a monetary alternative. The evidence in favour of the expressive voting theory is, however, rather mixed. Fisher (1996) and Feddersen et al. (2009), for instance, report supporting evidence, but Carter and Guerette (1992), and Tyran (2004) only find weak support for the expressive voting hypothesis, while Kamenica and Egan Brad (2014) find no support at all.[3] This warrants further research on this topic.

This paper contributes to the literature of voter turnout and expressive behaviour by examining the impact of ideological voting in a laboratory democracy. Firstly, we argue that the available literature ignores one central aspect of voting behaviour, namely that individuals have different preferences regarding the moral choice. It hardly needs further illustration that traditional left-wing (or socialist) voters favour redistribution, whereas traditional right-wing (or capitalist) voters favour efficiency. In other words: a priori it is not clear whether expressive voting takes place when the moral choice

[1] Models that only contain instrumental preferences in voters' utility functions fall short in predicting turnout anywhere near that observed in real elections. The only paper we are aware of that predicts reasonable turnout rates using a pure instrumental model of voting is Levine and Palfrey (2007).
[2] Hamlin and Jennings (2011) consider identity confirmation just as one example of expressive behaviour and propose a much broader definition including duty, morality, (self-)deception etc.
[3] See Hillman (2010) for a summary of the design and experimental findings of these studies.

depends on the individual's judgment of what is “moral”. Secondly, previous experimental studies did not aim to mimic a democracy in which the majority of the votes would determine the policy outcome. As the expressive voting theory is based on the principle that expressive voting would matter only if the electorate is large (i.e., when the probability of being pivotal is small) and not when the electorate is small, we design an experiment mimicking a democracy in which we vary the size of the electorate to examine voting behaviour to assess the evidence in favour of expressive voting.

Our approach is as follows. First, we build a simple decision-theoretic model in which voters have three sources of utility: monetary utility, ideological instrumental utility, and ideological expressive utility. Next, we set up a laboratory experiment in which we test our model predictions. That is, we mimic a democracy in which voters choose between different societal outcomes and are confronted with the monetary and re-distributional consequences of their vote (that is, the majority of votes). Another key feature of the experimental set-up to mimic reality is that voters pay a cost to participate in the election and a strict majority rule determines the outcome. The experiment includes two voting decisions: In the first place, voters face the decision to participate in the election or to abstain. In the second place, in case of participation, voters have to choose between two ideological options. Option A distributes income equally but restricts aggregate income, whereas option B distributes income unequally but aggregate income is higher. The key experimental parameter we vary in the experiment is the number of voters in the electorate (pivot probability). As said, we do so to examine the theoretical prediction that voters will act more expressively as the electorate grows.

We examine our experimental data using a Heckman selection model that includes equations for the participation decision as well as the voting decision. Our empirical results show that political ideology is able to explain positive voter turnout in large-scale political elections. That is, we find that non-ideological voters (i.e., voters without clear preferences regarding the possible societal outcomes) more often abstain and that they do so more than ideological voters when the probability of casting a pivotal vote decreases (i.e., *a turnout effect of expressive ideological voting*). Second, we find that ideological voting of participating left-wing/socialist voters is non-decreasing when the probability of casting a pivotal vote decreases (i.e., *a preference effect of expressive ideological voting*). However, we do not find such an effect for right-wing/capitalist voters.

The remainder of this paper is organized as follows: section 2 presents our decision-theoretic model, from which we derive our hypotheses. Section 3 describes the experiment and section 4 the data that is obtained in the experiment. Section 5 offers the empirical results. The paper ends with a conclusion in section 6.

2 Decision-theoretic model

We introduce a trade off in a decision-theoretic model with monetary and expressive utility similar to Feddersen et al. (2009).[4] This model is based on the idea that voters, after a costly decision to vote, face a choice that (with some probability) will affect their payoff, but also the payoff of other voters. There is a choice between two outcomes: outcome A is a society where individual incomes are equal, but aggregate output is relatively low, whereas outcome B is a society where individual incomes are unequal, but aggregate output is relatively high. We leave it open which of the two outcomes is morally justified, but assume that outcome A is preferred by voters with predominantly socialist preferences (left-wing voters) and outcome B is preferred by voters with capitalist preferences (right-wing voters).

Our model assumes 3 types of voters to generate a laboratory democracy where all decisions are monetarily and ideologically incentivised. Type 1 consists of voters who would receive higher monetary payoffs if option B would be selected (the blue voters). Type 2 consists of voters who are indifferent between option A and option B in monetary terms (the green voters). Type 3 consists of voters who are worse off in monetary terms if option B would be selected (the yellow voters). The payoff structure of the model is summarized in table 1.

Table 1. Monetary payoff structure under option A and B conditional on type (colour)

	Blue	**Green**	**Yellow**
Option A	**1**	**1**	**1**
Option B	**1+X (where X>1)**	**1**	**0**
Cost of voting	**c**	**c**	**c**

To ensure that that the model fits in with our assumptions about political preferences, we impose that **X**>1 such that aggregate output is higher under option B. Socialist/left-wing voters should prefer option A because of higher income equality, while capitalist/right-wing voters should prefer option B because of higher aggregate income. Yet, from an individual point of view, pocketbook voting (i.e., choosing for the outcome with the highest monetary rewards) may drive voters to the alternative option. For all types we assume a fixed cost equal to **c** that should be paid if one decides to vote. We do so to resemble the opportunity costs of voting costs in real political elections.

In our model voters derive material utility from monetary payoffs. Furthermore, they derive two types of ideological utility: instrumental ideological utility ($\boldsymbol{\delta}$), which is obtained when the preferred economic system is selected. This may be due to, for example, inequality aversion or maximum aggregate income preferences. The second type of utility is expressive ideological utility (**d**). The expressive ideological component is obtained when the voter has chosen the outcome that is in line with

[4] We argue that a decision-theoretic approach here is to be preferred over a game-theoretic approach as it is very unlikely that game-theoretic decisions are taken in the presence of large groups of unknown voters. Furthermore, a decision theoretic approach facilitates to trace-out the effect of pivotal probability on voting decisions and does not suffer from multiple equilibriums that are present in game theoretical models (see Levine and Palfrey 2007, Duffy and Tavits 2006)

his ideologically preferred option regardless of the election outcome, which can be attributed to several reasons such as internal dissonance reduction, warm-glow, or identity confirmation. If voters are in favour of left-wing (right-wing) policy they obtain $\boldsymbol{d}$>0 when voting for option A (B) and derive $\boldsymbol{\delta}$>0 if option A (B) is selected. Non-ideological voters always receive $\boldsymbol{\delta}$=**d**=0.

Below we examine for each of the 3 types in society and for each of the ideological positions what the decision is to optimize individual utility. First, we focus on the optimal vote itself and second, we focus on the decision to vote. On the basis of this examination we derive our hypotheses that we will test in an experiment and subsequent regression analysis.

Blue voters

The payoffs to a socialist blue voter under the two options can be written as follows:

$$\pi_{A,L}^{blue} = pr(1+\delta) + (1-pr)\big(1+\delta+q(1+x)\big) - c + d - e$$

$$\pi_{B,L}^{blue} = pr(1+x) + (1-pr)\big(1+\delta+q(1+x)\big) - c - e$$

The superscript denotes the type, the subscripts denote the option (A or B) as well as ideology (L=socialist, R=capitalist). The probability of being pivotal is *pr*; q is the probability that option B is chosen when the voter is not pivotal; and *e* is a payoff disturbance term that accounts for the possibility that choices may vary for unknown reasons. Conditional on voting, a socialist voter is expected to prefer option A over option B if $E(\pi_{A,L}^{blue}) \geq \mathrm{E}(\pi_{B,L}^{blue})$. This happens when the following condition is satisfied:

$$d \geq pr(x-\delta) \tag{1}$$

Equation (1) implies that if the probability of being pivotal decreases, more socialist voters will vote for A. If *pr* is high, socialist voters may favour option B because of instrumental monetary payoffs, which then dominate ideological payoffs.

Payoffs for a capitalist blue voter under the two options are:

$$\pi_{A,R}^{blue} = pr * \; + (1-pr)\big(1+q(1+x+\delta)\big) - c - e$$

$$\pi_{B,R}^{blue} = pr(1+x+\delta) + (1-pr)\big(1+q(1+x+\delta)\big) - c + d - e$$

Conditional on voting, a capitalist voter is expected to vote for B instead of A if $E(\pi_{B,R}^{blue}) \geq \mathrm{E}(\pi_{A,R}^{blue})$. This happens when the following condition is satisfied:

$$d + pr(x+\delta) \geq 0 \tag{2}$$

From equation (2) it logically follows that a capitalist voter always favours B over A since monetary and ideological payoffs are aligned. Likewise, non-ideological voters (i.e., d=δ=0) will always favour option B as well.

Given the optimal vote choice, we now examine when blue voters decide to pay the cost *c* to vote in the first place. We start with socialist voters. The payoff for a blue socialist voter not voting is:

$$\pi_{not,L}^{blue} = pr(1+\frac{x+\delta}{2}) + (1-pr)\big(1+\delta+q(1+x)\big) - e$$

A socialist voter will vote for option A rather than abstain if $E(\pi_{A,L}^{blue}) \geq \mathrm{E}(\pi_{not,L}^{blue})$.[5] This happens when the following is satisfied:

$$d - c \geq pr(\tfrac{x-\delta}{2}) \tag{3}$$

A voter who obtains a sufficiently large d (i.e., $d>c$) will turn out and vote for option A if *pr* decreases. If $d<c$ these voters will abstain. Non-ideological blue voters will never turn out and vote for A. Voters who receive no expressive payoff, d=0, will only turn out and vote for A if δ is large enough. Furthermore, if *pr* decreases such voters will ultimately abstain.

Finally, a socialist voter is expected to vote for B rather than abstain if:

$$c \leq pr(\tfrac{x-\delta}{2}) \tag{4}$$

If *pr* decreases sufficiently no socialist voter will turn out and vote for B.

We also need to check whether a blue capitalist voter chooses to pay the cost *c* to vote in the first place. The payoff for a blue capitalist voter not voting is:

$$\pi_{not,R}^{blue} = pr(1 + \frac{x+\delta}{2}) + (1-pr)\big(1 + q(1 + x + \delta)\big) - e$$

A capitalist blue voter chooses B rather than abstaining if $E(\pi_{B,R}^{blue}) \geq \mathrm{E}(\pi_{not,R}^{blue})$. This is satisfied when:

$$d + pr(\tfrac{x+\delta}{2}) \geq c \tag{5}$$

A non-ideological voter may turn out and vote for B if *pr* is sufficiently high. A voter who receives no expressive payoff d=0 will only show up and vote for B if $\delta + x$ is large enough. Furthermore, if *pr* decreases these voters will ultimately abstain. A voter who receives a sufficiently large d (d>c) will turn out and vote for B (as *pr* decreases). If $d<c$ fewer right-wing voters are expected to turn out, in particular when the pivotal probability decreases. A capitalist blue voter will never turn out and vote for A (see also equation (2)).

Green voters

Conditional on voting a green socialist voter receives the following payoff for choosing A or B.

$$\pi_A^{green} = pr(1+\delta) + (1-pr)(1+\delta+q) - c + d - e$$

$$\pi_B^{green} = pr * 1 + (1-pr)(1+\delta+q) - c - e$$

A green socialist voter stays loyal to his ideology if $\mathrm{E}(\pi_A^{green}) \geq \mathrm{E}(\pi_B^{green})$. This happens when the following is satisfied:

$$pr\delta + d \geq 0 \tag{6}$$

Equation (6) holds for both socialist and capitalist voters and, therefore, green voters with an ideological preference will vote in line with their ideological preference as the monetary pay-off is equal for both options A and B.[6]

[5] It should be noted that the ½ in the first term on the right hand side stems from the fact that if a voter who would have been pivotal decides not to vote (in case of a tie) then a fair probability rule determines the outcome.

We also need to check when a green voter chooses to pay the cost c to vote in the first place. The payoff for a green voter not voting is:

$$\pi_{not}^{green} = pr(1 + \frac{\delta}{2}) + (1 - pr)(1 + \delta + q) - e$$

A green voter, regardless of ideology, will choose to vote when $E(\pi_{A,B}^{green}) \geq \mathrm{E}(\pi_{not}^{green})$. This is satisfied when:

$$pr\frac{\delta}{2} + d \geq c \quad (7)$$

It follows that some minimum level of ideological utility should be obtained to consider a vote. Logically, non-ideological (d=δ=0) green voters will never vote since the left-hand side of equation (7) is always 0.[7]

Yellow voters

Conditional on voting a yellow left-wing voter obtains the following payoff for choosing A or B:[8]

$$\pi_{A,L}^{yellow} = pr(1 + \delta) + (1 - pr)(1 + \delta + q(0)) - c + d - e$$

$$\pi_{B,L}^{yellow} = pr * 0 + (1 - pr)(1 + \delta + q(0)) - c - e$$

A socialist yellow voter votes for A rather than B if $E(\pi_{A,L}^{yellow}) \geq \mathrm{E}(\pi_{B,L}^{yellow})$. This happens when the following condition is satisfied:

$$pr(1 + \delta) + d \geq 0 \quad (8)$$

This expression shows that a socialist voter will never vote for B. The same holds for non-ideological voters, even if pr declines.

Yellow capitalist voters obtain the following payoff for choosing option A or B:

$$\pi_{A,R}^{yellow} = pr(1) + (1 - pr)(1 + q(\delta)) - c - e$$

$$\pi_{B,R}^{yellow} = pr(\delta) + (1 - pr)(1 + q(\delta)) - c + d - e$$

Conditional on voting, a capitalist yellow voter will vote for B rather than A if $E(\pi_{B,R}^{yellow}) \geq \mathrm{E}(\pi_{A,R}^{yellow})$. This happens when the following condition is satisfied:

$$pr(1 - \delta) \leq d \quad (9)$$

If pr decreases capitalist voters are more likely to vote for B. A non-ideological voter will never vote for B.

Once more, we check when socialist yellow voters will pay the cost c to vote for option A in the first place. This happens if $(\pi_{A,L}^{yellow}) \geq \mathrm{E}(\pi_{Not,L}^{yellow})$ which is the case when the following is satisfied:

$$d + pr(\frac{1+\delta}{2}) \geq c \quad (10)$$

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[6] Since this results holds for both types of ideology we use no subscript indicating ideology.

[7] From the analysis above, it also follows that the turnout for green voters is expected to be lower than for blue voters. As will follow, the turnout is also expected to be lower for green voters than it is for yellow voters.

[8] The 0 in the equation below indicates that option B yield no utility to leftish voters, neither monetary nor ideological, see table 1.

If *pr* declines fewer yellow socialist voters will turn out if $d<c$. A non-ideological yellow voter may turn out and vote for option A if *pr* is sufficiently high, i.e. $pr/2>c$. Similar to the case of blue non-ideological voters voting for option A, a yellow non-ideological voter will never turn out and vote for option B, since d= δ=0.

We also need to check whether capitalist yellow voters will pay the cost *c* to vote for option A. This happens if $(\pi_{A,R}^{yellow}) \geq \mathrm{E}(\pi_{Not,R}^{yellow})$, which is the case when the following is satisfied:

$$pr(\frac{1-\delta}{2}) \geq c \tag{11}$$

If *pr* declines sufficiently such a voter will ultimately abstain. If *pr* is high and δ is low, turnout and a vote for option A may be possible due to monetary utility.

A capitalist voter will choose option B rather than abstain if $(\pi_{B,R}^{yellow}) \geq \mathrm{E}(\pi_{Not,R}^{yellow})$, which is the case when the following is satisfied:

$$pr\left(\frac{\delta-1}{2}\right) + d \geq c \tag{12}$$

When *pr* declines more yellow capitalist voters will abstain rather than vote for option B unless $d>c$. If *pr* is high and $\delta<1$ they may not turn out and vote for option B. A non-ideological yellow voter will never turn out and vote for B.

To summarize our findings: the expressive ideological component in our model produces behavioural patterns that are different from an instrumental model of ideological voting. The model predicts that as the probability of being the pivotal voter decreases, voters have a tendency to behave ideologically. This result is due to two ideological effects that influence voting decisions. Firstly, voters without an expressive payoff only have a tendency to participate when the pivotal probability is high due to instrumental monetary utility. When the pivotal probability declines these voters tend to drop out of the electorate at a faster rate than ideological voters. The reason is that the expressive terms (for all roles) will dominate the participation decision. Thus voters without expressive pay-off will never pay to vote and the proportion of ideological voters in the electorate will increase. This is an *ideological turnout effect*.[9]

> **Hypothesis 1:** Regardless of their type (colour), ideological voters display a larger probability to participate in the election than ideological voters. This is due to ideological utility. Furthermore, as pivotal probability declines, *d* will eventually dominate the participation decision. Since non-ideological voters have *d=0*, they are more likely to abstain when pivotal probability declines.

[9] Note that there is also a monetary turnout effect. That is, green voters abstain more than yellow and blue voters.

Secondly, ideology matters in explaining choices of voters who participate in large elections. It may, however, not matter more than in small elections due to instrumental ideological utility, which may have a significant impact on voting choices when pivotal probability is high. That is, when pivotal probability is low instrumental ideological utility is not heavily discounted, and therefore it can still impact choices significantly. When pivotal probability is low, sources of instrumental utility (monetary and ideological) are heavily discounted, and therefore we expect that ideology still matters in such a situation. So, the presence of the expressive ideological component generates an *ideological preference effect* that causes ideological preferences to matter in large elections.

Hypothesis 2: Conditional on voting, the effect of ideology on the choice between the two options is non-decreasing. That is, the probability that an ideological voter votes in line with his ideology is unaffected by pivotal probability. When voters have no impact on the outcome they prefer in terms of income or ideology, expressive utility dominates the choice decision.[10]

4.3 Experimental design

The experimental design is as follows: we mimic a democracy in which our experimental subjects first choose whether to participate in a costly election.[11] And secondly, upon participation, choose between two different options: option A (socialist outcome) and option B (capitalist outcome). The pay-offs of the two outcomes are displayed in Table 1 above. Subjects are randomly assigned to different types (i.e., colours) in each period of the experiment. Their payoffs depend on the type they are assigned, and on the outcome that is selected by a strict majority rule. In case of a tie a 50 per cent probability rule determined the outcome of the election. Our treatment variable, the number of voters in the electorate (or the pivotal probability), changes over the course of the experiment. The different treatments (electorate size) are depicted in Table 2 below. Table 2 also shows the composition of the electorate, i.e. number of subjects and computer subjects in the different treatments. We introduced computer subjects to increase the electorate size beyond the capacity of our research lab. The proportion of types (colours) in each electorate size remains constant throughout the experiment, namely 1/3. [12]

Every subject participated in only one session. In each session we had 5 treatments consisting of 8 periods, so that there are 40 decision periods, i.e. elections. In each of the 6 experimental sessions 15 subjects participated, that is 90 in total.

[10] In principle, one could argue that the impact of ideology on voting decisions would increase as the size of the electorate increases (and pivotal probability declines). This would be also evidence in favour of the theory of expressive voting and, in fact, imply a stronger form of hypothesis 2.
[11] Voting costs was kept constant throughout the experiment.
[12] All this was made explicit to the participants, apart from the estimate of pivotal probability. We made no reference to this concept before or during the experiment. See appendix for participant instructions.

Table 2. Treatment characteristics

	Number of subjects	Number of computer subjects	Total number of voters in each electorate	Estimate of pivot probability if the number of abstaining voters is zero [13]
Treatment 1	**3**	**0**	**3**	**50%**
Treatment 2	**15**	**0**	**15**	**21%**
Treatment 3	**15**	**285**	**300**	**3.5%**
Treatment 4	**15**	**89999285**	**90 million**	**0.00006%**
Treatment 5	**3**	**12**	**15**	**21%**

Note: In treatment 1 with 3-voter electorate size there were 5 electorates every period such that all participants made an equal number of decisions in each treatment.

Each experimental session had the following structure: first, the participants read and signed an informed consent stressing that communication was not allowed and that all obtained data would be made anonymous. This was followed by group instructions (see appendix).[14] We stressed that all decisions were made such that no other participant would know who made which choices during the experiment. During the group instructions, the experiment was first described in general terms. Then a specific example followed that corresponded to the first treatment of the specific session.[15] The instruction part ended with 7 questions to verify whether the participant had understood the experiment.[16] We also left room for questions. After the instruction the experiment continued in individual computer rooms to ensure full anonymity in order to resemble secret ballot voting as much as possible.[17]

The actual experimental session started when all participants were seated in the computer rooms. At the beginning of each period the subjects learned their colour. This colour was assigned randomly with a 1/3 probability.[18] Each period consisted of 3 stages. In each stage, the subjects were shown their colour during that period as well as a payoff matrix corresponding to table 1. Furthermore, the subjects were also shown the number of voters in the electorate and the number of types of voters, i.e. colour and computer subjects.[19]

In stage 1, subjects decided whether to participate or to abstain. The cost of voting was clearly stated. All subjects had to reach a decision before the experiment continued to the second stage.

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[13] In a two-choice election a pivotal vote is cast if exactly half of all other voters vote for option 1 while the other half of all other voters vote for option 2. It is assumed that each voter will prefer either option with 50% probability. Estimates for treatment 1, 2 and 5 are based on the standard binomial probability distribution. Estimates for treatment 3 and 4 are based on the formula *Pr(decisive)* = $\frac{3}{2\sqrt{2\pi(N-1)}}$, which works better when the number of voters is large, see Mueller (1989).

[14] During the instruction and the experiment, we only used neutral and general terms. That is, we never made reference to political ideology (left/right, socialist/capitalist). Furthermore, the two options were displayed as "option A" and 'option B', and we avoided terminology such as game, play and equality/inequality. It was also made clear that the assigned colour (role) had no other meaning, but displaying the role of each individual during that period. In general, we minimised any reference to the outside world.

[15] This was done to avoid anticipation effects with respect to future treatments. To avoid treatment order effects, we varied the treatment order each session. See appendix.

[16] Apart from the general instruction, we informed the subjects before each 8-period sequence of a new treatment about the new treatment (change in experimental set-up). That is, they were informed about the number of voters, the number of real subjects and computer subjects (for treatments with computer subjects also the probability rule governing the choice of computer voters was announced). Furthermore, in treatment 1 they were also informed about the random re-matching into new groups.

[17] A lottery determined in which computer room each participant would be placed.

[18] In treatment 1, the subjects were also randomly re-matched into new 3-subject groups each period.

[19] See Appendix for a screenshot of the stages in the experiment.

In stage 2, participating voters then decided whether to vote for option A or option B. At this stage voters did not know the number of voters who decided to abstain. Abstaining voters waited while participating voters made their decisions.

In stage 3 the subjects were informed about the outcome of the election and her/his (potential) payoff (if the period would be randomly selected as a paying period at the end of the experiment). The number of participating voters and the distribution of votes on the two options were also shown. Also, the entire subject specific history of types, outcome of the election and (potential) payoffs was visible in a history panel. Each period ended after stage 3.

To minimise strategic voting during the experiment we have opted for a stranger design.[20] That is, throughout the experiment subjects are randomly assigned a new colour each period.[21] Furthermore, in treatment 1 where each electorate only consists of 3 voters the voters are randomly re-matched into new electorates each period to further minimise the risk of strategic voting. This option is only available in treatment 1 where the electorate size is smaller than the number of subjects.[22] Another advantage of this 'stranger design' is that it minimises repeated game effects (see Andreoni and Croson 2008), because subjects have, at best, only limited information about the distribution of ideological preferences within the electorate.[23]

To have an electorate beyond the capacity of our research lab, we introduced computer subjects in treatment 3 and 4 (and 5). Their voting behaviour is determined by a simple probability rule. That is, with 50% probability computer subjects abstain. The computer subjects that do not abstain, vote with 50% probability for either option A or option B The introduction of these computer subjects, however, may induce behavioural differences across treatments other than the effect of pivotal probability. To investigate the implications of having computer subjects, we have included treatment 5 as a control treatment to check whether there are behavioural differences between treatment 2 and 5.[24] The electorate size in these two treatments is identical, namely 15. The only thing that varies is whether there are computer subjects present, 0 in treatment 2 and 12 in treatment 5. That variation allows us to gauge whether computer subjects induce differences in voting behaviour.

We announced before the start of the experimental session that all participants would be paid discretely in cash after the experiment. We aimed at avoiding wealth effects during the experiment by randomly drawing 5 periods (after the 40 periods) and let the individuals' (potential) payoffs in those

[20] By strategic we mean that a vote in period t would impact other voters decisions in period t+n, n=1,2,3…T. That is, tacit coordination to achieve some preferred goal.
[21] See also Cason and Mui (2007) who also apply random role assignment each period.
[22] In the situation where the electorate consists of only 3 voters, the random type (colour) assignment may be insufficient to counteract strategic voting and repeated game effects. Therefore, voters were randomly re-matched into a new electorate each period in treatment 1.
[23] Yet, to take account of the small possibility that voters do behave strategically, we include past election outcomes in our regression analysis to control for past outcomes on current decisions.
[24] A Heckman analysis where treatment 2 and the control treatment are compared shows no evidence that the treatment with computer voters and identical electorate size has an effect on the choices made in the experiment; the results are available on request.

periods determine their individual earnings.[25] The subjects were given a show-up fee of 5€ and a lump-sum payment to cover voting participation costs during the experiment.[26] We also conducted a small survey after the experiment (to avoid priming effects) to obtain information about ideological preferences and personal background. The survey consisted of 10 questions.

4.4 Data

We conducted a total of six experimental sessions in the Groningen Experimental Economics Laboratory. The subjects were recruited through a flyer-campaign at the Zernike campus in Groningen, the Netherlands. Interested participants could enrol for one of the six sessions online. 90 subjects took part in the experiment of which 56 were male and 34 female. 70% of the participants were students of the Faculty of Economics and Business. The others came from other faculties such as the Faculty of Mathematics and Natural Sciences, Arts, and Medical Sciences. 80% of the participants were bachelor students and 15% were master students. The few other students were pre-master or Ph.D. students. About half of the participants (48) were Dutch; 26 students had EU citizenship but non-Dutch. The remaining 16 students were from outside the EU.

Fig. 1 shows the ideological preferences with respect to societal outcomes of the subjects based on the data from our survey. On the basis of figure 1, three observations can be made: (1) there are more capitalist voters than socialist voters in our sample. (2) For each value on the 7-point Likert scale that we used to measure preferences, most subjects do not have strong preferences towards either socialist outcomes or capitalist outcomes. (3) Most participants in the experiment have moderate views on socialist or capital outcomes, as there is hardly any mass in the tail of the distribution.

[25] Wealth effects can distort behaviour in the experiment if, for example, subjects with high (low) earnings feels satisfied (dis-satisfied) with their earnings and begin making decision without proper consideration of the (monetary) consequences thereof. By randomly drawing 5 paying periods after the experiment, each individual period has a larger perceived impact on earnings, and because the subjects do not know which periods that determine payoffs during the experiment we mitigate wealth effects.

[26] We made use of Experimental Currency Units (ECUs) during the experiment. The exchange rate was 200 ECU=1€. Average earnings were 11,50€, the maximum amount earned was 14,50 and the minimum amount earned was 8,40. Before the experiment the subjects were informed that earnings would average around 12€ and would fall between 8-16€. No session lasted longer than 65 minutes.

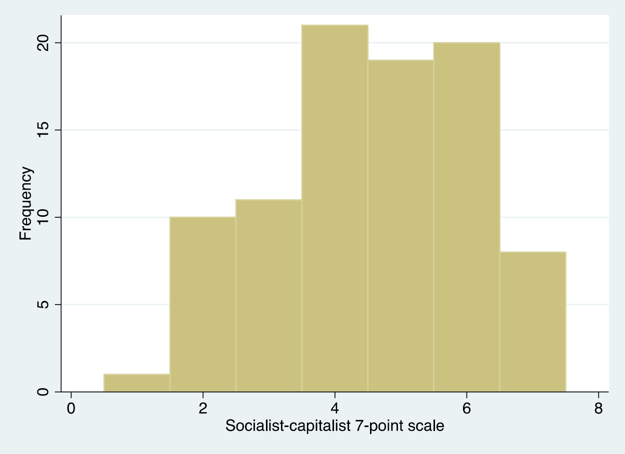

Fig 1. Distribution of ideological beliefs

Note: Fig. 1 is based on the survey conducted after the experiment. The subjects were asked to rank their preference for redistribution versus economic efficiency on a 7-point scale from socialist to capitalist. The figure is based on all 90 observations.

In table 3 we show all decisions made in the experiment by treatment. We observe that, as expected, the number of voters who abstain increases when the pivot probability declines. This is a '*size effect*' consistent with observed behaviour in previous studies.[27]

Additionally, the distribution of votes is skewed towards option A in the treatments with high pivotal probability and balances out as pivot probability declines. That is, 61% (=318/525) opted for option A whereas in treatment 4 this percentage has dropped to 46% (=167/ 365) of the voters. We have two potential explanations for this finding. First, it could be due to the fact that participants (independent of ideology) may derive utility from knowing that other participants also receive income in the experiment and do not want to cause others to receive a zero payoff (a fairness towards others effect). This effect may be the result of the introduction of computer subjects in treatment 3 and 4. This view is supported by the percentage of votes for Option A in treatment 5 (i.e., 52%), which is 9 percentage points lower than in treatment 2 and similar to the percentage of votes in favour of option A in treatments 3 and 4.[28] Another explanation for this bias in favour of option A could be that voters with socialist preferences relative to capitalist voters are less likely to abstain as the pivot probability declines relative to voters with capitalist preferences. This view is, however, not supported by the data (see also section 4.5 where we examine the determinants of the participation decision).

[27] See, for example, Levine and Palfrey 2007.

[28] Yet, when we examine voting choices in a multivariate regression model that controls for selection effects, we do not find evidence that computer voters induced significant behavioural differences in subjects' voting choices. That is, a comparison of choices in treatments 2 and 5 where pivotal probability is constant, but treatment 5 includes computer voters. Results are available on request.

Table 3. Decisions by treatment

	Treatment					
Decision	**1**	**2**	**3**	**4**	**5 control**	**Total**
Abstain	**195**	**280**	**322**	**355**	**277**	**1429**
Vote for option A (% refer to share of A votes relative to total votes)	**318 (61%)**	**276 (61%)**	**220 (55%)**	**167 (46%)**	**230 (52%)**	**1211**
Vote for option B	**207**	**178**	**178**	**198**	**213**	**960**
Total	**720**	**720**	**720**	**720**	**720**	**3600**

Note: Depicted in each cell is the number of votes for the option (read horizontally) and for the category (read vertically). 5 is the control treatment, compare with treatment 2. The 90 subjects each participated in 40 rounds of the experiment, so we have 90*40= 3600 observations in total. Each of the 5 treatments lasted for 8 periods. So, we have 90*8=720 observations for each treatment.

Table 4 shows the same data but now we categorize by colour. There are three noteworthy patterns visible in the table. Firstly, we observe that even though it is against the economic self-interest of voters to vote option A when assigned the blue colour, this has happened in about 12% (=146/1200) of all cases. The reverse, voting option B when assigned the yellow colour happens only in 1,5% (=20/1200) of all cases. Secondly, we observe that, as expected, voters in the green role abstain more often than other voters. Since green voters have no economic motive to participate in the elections, this indicates that ideological motivations could play a role in their decision-making. It further should be noted that for the green votes, there is a tendency to vote option A. Thirdly, voters in the yellow role abstain twice as often as blue voters.[29, 30]

Table 4. Decision by colour

	Colour			
Decision	**Blue**	**Green**	**Yellow**	**Total**
Abstain	**254**	**667**	**508**	**1429**
Vote for option A	**146**	**393**	**672**	**1211**
Vote for option B	**800**	**140**	**20**	**960**
Total	**1200**	**1200**	**1200**	**3600**

Note: Depicted in each cell is the number of votes for the option (read horizontally) and for the category (read vertically). The 90 subjects each participated in 40 rounds of the experiment, so we have 90*40=3600 observations in total. In each round 1/3 of the subjects had each type; that is blue, green or yellow. So, we have 1200 observations for each type.

Table 5 shows the decisions made in the experiment but now categorized by ideology. Here, we find that centre voters abstain more often then voters with clear socialist or capitalist preferences. Centre

[29] This may be caused by the asymmetry of the payoff matrix. Voters in the blue role receive x=1.5 when option B wins. Voters in the yellow role receive 1 when option A wins. Therefore, the pivotal probability threshold at which they decide to abstain is lower. Furthermore, yellow voters receive negative income if they participate in the election and option B wins. This may have led yellow voters to abstain to prevent losing money (i.e., loss aversion).

[30] 9 individuals never abstained but alternated between option A and option B in all 40 periods. 2 individuals never voted for option A, but alternated between abstaining and option B. 1 individual never voted for option B, but alternated between abstaining and option A.

voters have about a 20-percentage point higher probability to abstain than other voters (55% vs. 34% (socialist) vs. 35% (capitalist), respectively). It can also been seen that the group with relatively the most votes for option A are the socialist (62%). However, it comes as unexpected that the capitalist vote in 55% of the cases for option A, whilst the centre non-ideological voters vote in exactly 50% of all cases for option A

Table 5. Decision by ideology

	Ideology			
Decision	**Socialists**	**Centre**	**Capitalist**	**Total**
Abstain	302	460	667	1429
Vote for option A	359	190	662	1211
Vote for option B	219	190	551	960
Total	880	840	1880	3600

Note: Depicted in each cell is the number of votes for the option (read horizontally) and for the category (read vertically). 22 subjects indicated they were socialist (left) of centre. Since all subjects participated in the experiment for 40 periods we have 22*40=880 observations for socialists, and so forth for centre and capitalist voters.

We also examine our data with respect to characteristics of our experimental subjects. Characteristics other than ideological preferences may be driving their choices in the experiment. We examine the participation choice and the vote choice by running bivariate regressions. The personal characteristics that we include in the regressions are: age, gender, whether the subjects have casted a vote in real elections, the educational program (i.e., whether the students is doing a B.Sc., (Pre-)M.Sc, or Ph.D.), the faculty at which the student is enrolled, the income level of the family, and nationality. The results are reported in table 6. Since the regressions are based on many dummy variables, we opt to report only the included number of observations, the R-squared of the regression and the regression F-statistic as well as its p-value. As can be seen from the table, almost all included variables influence the participation decision (except for gender and real election participation), whereas the educational program / faculty only seems to affect the choice between option A and B. Yet, it is also apparent that the R-squared of all the regressions is very close to 0, which implies that these variables explain only a small part of the variation contained in the dependent variables.

Table 6. Personal characteristics vs. participation and voting behaviour

Dependent variable: participate decision

Explanatory variable	(1) Age	(2) Gender	(3) Participate	(4) Education program	(5) Family income	(6) Faculty	(7) Nationality
Observations	2,880	2,880	2,880	2,880	2,880	2,880	2,880
R-squared	0.012	0.001	0.000	0.009	0.013	0.012	0.033
F-test	3.951	0.356	0.0103	10.14	3.105	3.673	6.467
Prob > F	0.0499	0.552	0.919	0.000	0.0125	0.00455	0.002

Dependent variable: choice between option A and B

Explanatory variable	(1) Age	(2) Gender	(3) Participate	(4) Education program	(5) Family income	(6) Faculty	(7) Nationality
Observations	1,728	1,728	1,728	1,728	1,728	1,728	1,728
R-squared	0.001	0.001	0.000	0.016	0.008	0.007	0.002
F-test	0.379	0.248	0.0583	116.64	0.751	17.24	0.360
Prob > F	0.540	0.620	0.810	0	0.588	0	0.701

5 Empirical analysis

To test our hypotheses, we estimate a Heckman selection model (Heckman 1979). We opt for this model as it allows us to correct for selection bias in our sample. That is, our decision-theoretic model predicts that as the electorate grows non-ideological voters are more likely to abstain than ideological voters (hypothesis 1). Furthermore, the model also predicts that green voters are less likely to participate in the second stage of the experiment than voters with other colours. Since we would like to have unbiased estimates in the second stage as well, the Heckman correction is the natural way to proceed. An important condition to be fulfilled, however, is to have an exclusion restriction in the first stage of the model for proper identification.[31] That is, the model should include a variable in the first stage (the selection equation) that is not a determinant of the dependent variable in the second stage. In our case, we use a proxy for the perception of being the pivotal voter during previous rounds of the experimental session. This variable, labelled *near pivotal*, is created using the ratio of votes for the two options. If this ratio lies between 0.45-0.55, then our measure is equal to 1, while it is 0 otherwise. We believe that the one period lag of the "near pivotal" variable is suited to serve as an exclusion restriction. It is likely that the perception of voters of being pivotal does influence the participation decision in the following period, but does not influence voting preferences (option A versus option B). As reported in our regressions below, we find that the "near pivotal" variable is a significant determinant of the participation decision in all regression specifications.

Apart from selection bias, we take account of omitted variables bias by including several control variables. First, we include dummies that capture the type (colour) of the subject in the experiment. We expect that blue and yellow voters are more likely to participate (for all treatments) than the green

[31] In principle, identification could also follow from the non-linearity of the first stage of the model. However, this would require sufficient mass in the tails of the distribution of the Inverse-Mills ratio. Yet, we do not rely on this feature (only) and use the available exclusion criterion.

voters, as the latter group does not have a monetary incentive to do so. We also expect that yellow voters are more likely to vote in favour of option A and blue voters are more likely to vote in favour of option B, because it is in their monetary interest to do so. That is, the significance of the colour dummies below reveals pocket book voting. Second, we include a measure (*period*) to control for learning effects during the experiment. The variable is equal to the period in in which the decision was made, i.e. 3 in period 3 and so forth. The variable enters linearly in the regression. Third, we include session dummies that indicate in which of the 6 sessions of the experiment a given subject participated.[32] Fourth, we also account for the fact that participants base their vote on the (preferred) outcome that materialized in the previous round in terms of ideological preference. This variable is equal to 1 if the subject is a capitalist and option B won the election, and if the subject is a socialist and option A won the election in the previous round.

To test our hypotheses, we focus on the estimates related to ideology and their interaction with the size of the electorate, i.e. treatment. We include dummies that capture ideology with respect to socialist and capitalist preferences.[33] To model the size of the electorate we have two approaches. That is, treatment enters linearly (in specifications 1-2) or dummy variables are used for each of the treatments (electorate sizes) in our experiment (in specification 3-4). The first proxy is included to facilitate interpretation, whereas the second proxy is used to account for possible non-linearity in the effect of the treatment variable.

Table 7 shows our estimation results. Naturally, the results of the first stage of the Heckman model relate to hypothesis 1 (i.e., the participation decision). These are the odd-numbered columns. The results of the second stage of the Heckman model relate to hypothesis 2 (i.e., voting behaviour). These are the even numbered columns. Before we report on our findings, it should be noted that the estimated Inverse Mills ratio is significant for both models, which indicates that indeed selection takes place in the first stage and the Heckman model is the appropriate model to use here.

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[32] This was done to be able to control/test whether treatment order, which was varied in the experiment, mattered. See appendix for the treatment order in the 6 sessions. Concerning the outcome choice we find that these session dummies are jointly significant, so we include them as controls in our analysis.

[33] We transform our 7-point scale into three dummies. First, we identify socialist voters for the cases where our scale has values 1-3 and we identify capitalist voters where our scale has values 5-7. The voters who identify themselves in the middle (value=4) are labelled as centre voters.

Table 7. Heckman selection model: Centre voter benchmark

		(1)	(2)	(3)	(4)
VARIABLES	Participate=(y=1) Option B=(y=1)	Participate/ Abstain	Option A or B	Participate/ Abstain	Option A or B
Yellow		0.274**	-0.277***	0.276**	-0.304***
		(0.021)	(0.000)	(0.020)	(0.000)
Blue		0.947***	0.380***	0.952***	0.313***
		(0.000)	(0.001)	(0.000)	(0.006)
Socialist D (dummy)		0.479**	-0.190**	0.396*	-0.187*
		(0.010)	(0.048)	(0.068)	(0.059)
Capitalist D		0.333*	-0.054	0.423**	-0.132
		(0.050)	(0.481)	(0.027)	(0.114)
Treatment L (linear)		-0.318***	0.124***		
		(0.000)	(0.010)		
Socialist D*treatment L		0.136	-0.030		
		(0.169)	(0.357)		
Capitalist D*treatment L		0.190**	-0.078**		
		(0.029)	(0.040)		
Treatment 2 D				-0.472***	0.043
				(0.008)	(0.587)
Treatment 3 D				-0.882***	0.318**
				(0.000)	(0.014)
Treatment 4 D				-0.901***	0.448***
				(0.000)	(0.000)
Socialist D*treatment 2 D				0.296	-0.117
				(0.260)	(0.194)
Socialist D*treatment 3 D				0.464	-0.153
				(0.103)	(0.142)
Socialist D*treatment 4 D				0.381	-0.158*
				(0.191)	(0.088)
Capitalist D*treatment 2 D				-0.071	0.083
				(0.722)	(0.292)
Capitalist D*treatment 3 D				0.450*	-0.191*
				(0.067)	(0.053)
Capitalist D*treatment 4 D				0.412	-0.259***
				(0.113)	(0.007)
Period		-0.014***	0.005**	-0.015***	0.006***
		(0.000)	(0.022)	(0.000)	(0.009)
Preferred outcome t-1 (ideology)			0.009		0.018
			(0.718)		(0.455)
Near pivotal t-1		0.117*		0.116*	
		(0.064)		(0.081)	
Session dummies			Yes		Yes
Inverse Mills ratio			-0.365*		-0.502**
			(0.097)		(0.023)
Constant		0.077	0.426**	0.198	0.556***
		(0.608)	(0.014)	(0.229)	(0.001)
Observations		2,790	1,655	2,790	1,655
R-squared			0.555		0.563
Log-likelihood		-1652		-1640	

P-values in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Note: P-values are: clustered at the individual level in the participate regression, and block-bootstrapped at the individual level with 500 repetitions in the outcome regression. First stage estimates are based on a probit specification; second stage estimates are based on a linear probability model specification.

We do not include treatment 5 (the control treatment) in our estimates, as this treatment only was used to analyse the effects of computer voters on the participants voting behaviour. There are 720 observations within each treatment, so we have 4*720 minus 90 observations for the lagged variable, which equals 2790 observations on the participate/abstain decision. 1655 of those observation decided to participate, that explains the number of observations on the outcome decision.

Columns 1 and 2 report the estimation results for the case where the treatment variable enters linearly. We find that ideological voters are more likely to participate in the election than non-ideological voters. We also find that both the socialist voters and the capitalist voters abstain less often compared to centre voters when the electorate grows larger. This last finding is based on estimates from a linear probability model (LPM) specification; see figs. 2 and 3 below. Hence, both groups of ideological voters vote in line with hypothesis 1. The evidence for hypothesis 2 is, however, less clear. We find a significant preference for option A by the socialist voters and this effect does not vanish when more voters enter the election, which is evidence in favour of hypothesis 2. However, we also find that capitalist voters become more socialist relative to the non-ideological and socialist voters when the electorate grows large. This is at odds with the theory of expressive voting because it is expected that capitalist voters would vote in line with the ideological preference when the probability of being pivotal becomes negligible.

The results in column 3 and 4 confirm the findings reported above to a large extent. Here we have used separate dummies for the different treatments that we (also) interact with our measures for ideology. Again, we find that ideological voters are more likely to participate than non-ideological voters (the dummies for ideology are both significant) and that the inclination to participate does not decline with ideology when the electorate is large. In all, this is evidence in favour of hypothesis 1. We do (again) find support for hypothesis 2 when we focus on socialist voters. In fact, their inclination to vote for option A increases with the size of the electorate (interaction effect with treatment dummy #4). However, we do not find any evidence for hypothesis 2 when we focus on capitalist voters. Relative to the non-ideological voters they are more inclined to choose option A, also when the electorate grows. We find highly significant results for the capitalist voters to be more socialist under treatment 3 and treatment 4. We reflect on this finding in our conclusions.

To analyse the effect of ideology conditional on treatment concerning the participate/abstain decision (hypothesis 1) we plot the marginal effect from a linear probability model (LPM) with identical variable specification as column 1 and 3 in table 7 in figs. 2 and 3 below. A LPM is used to aid interpretation of the effect of the interaction terms.[34]

[34] The resulting estimates are similar in terms of sign and significance to the results of the first stage probit estimates in table 7; the results are available on request.

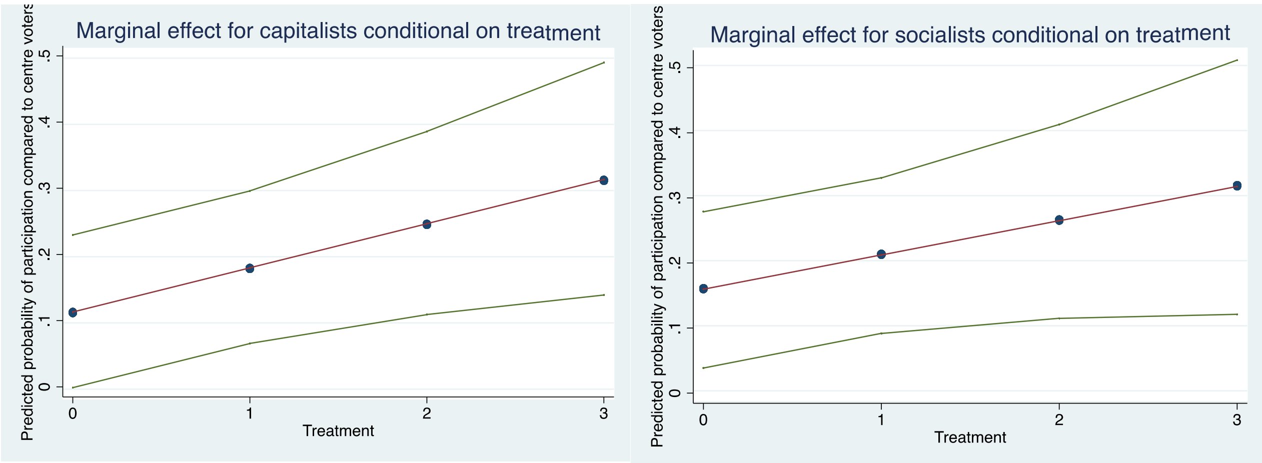

Fig. 2. The marginal effect of ideology on participation choice conditional on treatment (linear effect of treatment)

Note: Fig. 2 is based on a linear probability model with identical variable specification as column 1 in table 7. The figure shows that the estimate difference in the probability of participation between ideological and non-ideological voters grows as pivotal probability declines.

The marginal effect displayed in fig. 2 shows the difference in the predicted probability of participation between capitalist and centre voters conditional on treatment in the left pane. As expected this difference in increasing when pivotal probability declines. The difference is statistically significant in all treatments except treatment 1 with the highest pivotal probability. The right pane displays the difference in the predicted probability of participation between a socialist and centre voters conditional on treatment. Again the estimated difference is increasing in treatment. Here the difference is statistically significant for all treatments.

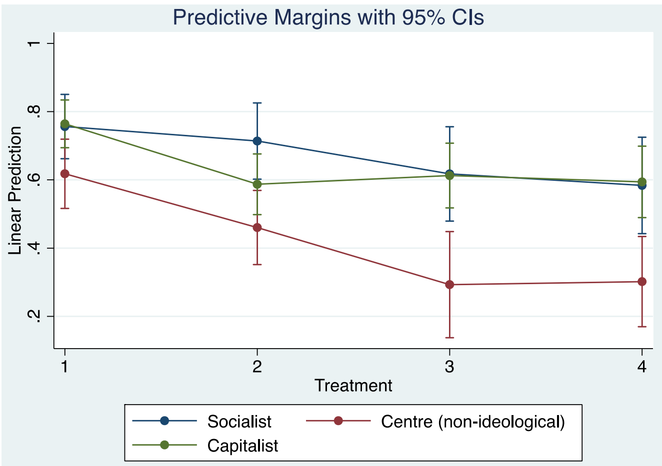

Fig. 3. The marginal effect of ideology on participation choice conditional on treatment (non-linear effect of treatment)

Note: Fig. 3 is based on a linear probability model with identical variable specification as column 3 in table 7. The figure shows that the estimate difference in the probability of participation between ideological and non-ideological voters grows as pivotal probability declines (apart from treatment 3 to 4 where the differences remains constant).

Fig. 3 displays the effect of ideology conditional on treatment when treatment enters non-linearly (treatment dummies). We observe a similar pattern as observed in fig. 2. As the size of the electorate grows, centre voters are less likely to participate compared to both socialist and capitalist voters. I.e. centre voters drop out of the electorate at a faster rate than ideological voters. The difference between centre and socialist voters is statistically significant in all treatments except for treatment 1. The difference between centre and capitalist voters is statistically significant in treatments 3 and 4.

To probe the robustness of our results, we run additional regressions in which we control for available information regarding the personal characteristics of our subjects in the experiment. The variables we include are: age, gender, educational background, family income, Faculty of Economics and Business (FEB student), citizenship, and previous participation in real elections. This exercise allows us to take account of the fact that the subjects selected themselves into the experiment. Yet, including those variables is not a panacea insofar as personal characteristics do cause ideology (instead of correlating with ideology). In order to examine the confounding effect of these personal characteristics, we enter them one by one into our model. The results of the robustness analysis are reported in table 8 and are based on the model specification in which we treat the treatment variables linearly.[35] We find that the results are robust to the inclusion of most personal characteristics.

[35] We have also estimated the models using the treatment dummies instead. Using this alternative specification does not alter our insights. The results are available on request.

Table 8. Heckman selection model: Centre voter benchmark, with additional controls

VARIABLES	Participate (y=1) Option B (y=1)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
		Participate / Abstain	Option A or B	Participate / Abstain	Option A or B	Participate / Abstain	Option A or B	Participate / Abstain	Option A or B	Participate / Abstain	Option A or B	Participate / Abstain	Option A or B	Participate / Abstain	Option A or B
Yellow		0.277**	-0.281***	0.277**	-0.296***	0.270**	-0.275***	0.278**	-0.288***	0.275**	-0.288***	0.271**	-0.216***	0.274**	-0.280***
		(0.018)	(0.000)	(0.020)	(0.000)	(0.023)	(0.000)	(0.021)	(0.000)	(0.021)	(0.000)	(0.025)	(0.000)	(0.021)	(0.000)
Blue		0.960***	0.367***	0.948***	0.332***	0.954***	0.387***	0.964***	0.340***	0.948***	0.347***	0.981***	0.581***	0.947***	0.377***
		(0.000)	(0.002)	(0.000)	(0.007)	(0.000)	(0.001)	(0.000)	(0.002)	(0.000)	(0.003)	(0.000)	(0.000)	(0.000)	(0.002)
Socialist D (dummy)		0.450**	-0.184**	0.479**	-0.207**	0.487**	-0.176*	0.474**	-0.212**	0.506**	-0.214**	0.383**	-0.092	0.481**	-0.185*
		(0.020)	(0.040)	(0.011)	(0.034)	(0.010)	(0.076)	(0.013)	(0.015)	(0.011)	(0.032)	(0.042)	(0.245)	(0.013)	(0.055)
Capitalist D		0.305*	-0.050	0.338*	-0.069	0.317*	-0.023	0.321*	-0.099	0.332*	-0.062	0.286*	0.009	0.334*	-0.055
		(0.068)	(0.489)	(0.052)	(0.382)	(0.070)	(0.770)	(0.087)	(0.173)	(0.053)	(0.420)	(0.092)	(0.897)	(0.050)	(0.475)
Treatment L (linear)		-0.321***	0.130***	-0.318***	0.145***	-0.318***	0.126***	-0.322***	0.147***	-0.318***	0.138***	-0.328***	0.036	-0.318***	0.127***
		(0.000)	(0.009)	(0.000)	(0.003)	(0.000)	(0.006)	(0.000)	(0.002)	(0.000)	(0.004)	(0.000)	(0.410)	(0.000)	(0.008)
Socialist D*treatment L		0.136	-0.033	0.134	-0.041	0.136	-0.033	0.135	-0.046	0.135	-0.037	0.153	0.020	0.136	-0.032
		(0.170)	(0.346)	(0.173)	(0.207)	(0.169)	(0.285)	(0.171)	(0.187)	(0.172)	(0.246)	(0.127)	(0.520)	(0.170)	(0.318)
Capitalist D*treatment L		0.193**	-0.081**	0.190**	-0.091**	0.187**	-0.080**	0.194**	-0.095**	0.189**	-0.087**	0.200**	-0.019	0.190**	-0.080**
		(0.027)	(0.043)	(0.028)	(0.018)	(0.031)	(0.025)	(0.027)	(0.015)	(0.029)	(0.021)	(0.022)	(0.592)	(0.029)	(0.034)
Period		-0.014***	0.005**	-0.013***	0.006**	-0.013***	0.005**	-0.013***	0.005***	-0.014***	0.005**	-0.013***	0.002	-0.014***	0.005**
		(0.000)	(0.017)	(0.000)	(0.010)	(0.000)	(0.014)	(0.001)	(0.005)	(0.000)	(0.011)	(0.001)	(0.346)	(0.000)	(0.022)
Preferred outcome t-1 (ideology)			0.009		0.011		0.006		0.009		0.010		0.007		0.009
			(0.739)		(0.687)		(0.796)		(0.722)		(0.694)		(0.796)		(0.718)
Near pivotal t-1		0.125*		0.114*		0.119*		0.126**		0.112*		0.144**		0.117*	
		(0.059)		(0.075)		(0.064)		(0.044)		(0.076)		(0.027)		(0.064)	
Session dummies			Yes		Yes		Yes		Yes		Yes		Yes		
Age		0.067*	-0.017												
		(0.096)	(0.221)												
Gender (Male=1)				-0.087	0.050										
				(0.574)	(0.192)										
Educational program dummies						Yes	Yes								
Family income category dummies								Yes	Yes						
Faculty dummy (FEB student=1)										0.072	-0.031				
										(0.675)	(0.499)				
EU citizen (NL base)												-0.573***	0.056		
												(0.002)	(0.404)		
Non-EU citizen (NL base)												-0.362*	-0.032		
												(0.058)	(0.624)		
Participate in real elections (yes=1)														0.015	0.029
														(0.939)	(0.590)
Inverse Mills ratio			-0.391*		-0.460**		-0.356		-0.445**		-0.429*		0.055		-0.370*
			(0.081)		(0.049)		(0.116)		(0.035)		(0.060)		(0.781)		(0.098)
Constant		-1.243	0.784*	0.119	0.472***	0.077	0.427**	-0.033	0.519***	0.026	0.495***	0.473**	0.126	0.065	0.406**
		(0.121)	(0.060)	(0.477)	(0.006)	(0.625)	(0.017)	(0.839)	(0.003)	(0.898)	(0.007)	(0.024)	(0.281)	(0.789)	(0.025)
Observations		2,790	1,655	2,790	1,655	2,759	1,624	2,790	1,655	2,790	1,655	2,790	1,655	2,790	1,655
R-squared			0.556		0.556		0.568		0.561		0.555		0.559		0.555
Log-likelihood		-1636		-1650		-1635		-1635		-1651		-1606		-1652	

P-values in parentheses: *** p<0.01, ** p<0.05, * p<0.1

P-values are: clustered at the individual level in the participate regression, and block-bootstrapped at the individual level with 500 repetitions in the outcome regression. First stage estimates are based on a probit specification; second stage estimates are based on a linear probability model specification.

4.6 Conclusion

In this paper we have tested the theory of expressive voting in relation to political ideology in a laboratory experiment. We have derived our hypotheses from a decision theoretic model and examined voting decisions in an experiment in which we use the size of the electorate as the treatment variable. Using a Heckman selection model that includes both the electoral participation decision and voting behaviour, we find mixed results for the expressive voting hypothesis. The strongest result that we find is that the expressive voting theory is well able to predict turnout in (the laboratory) election(s). That is, we find that voters with clear ideological preferences with respect to redistribution or efficiency are more likely to participate in the election than voters who have no strong preferences. We find that this is especially true when the size of the electorate is large and, hence, the likelihood of being the pivotal voter is small. Our evidence for expressive voting concerning the choice between the two options in the experiment is less strong. We do find a clear ideological effect that does not depend on the size of the electorate regarding the socialist voters in our sample. However, this effect is not there for the capitalist voters. In fact, we have some indication that these voters also become more socialist when the electorate is large and the pivotal probability is small.

It is beyond the scope of this paper to understand why socialist voters are different from capitalist voters with respect to expressiveness. One plausible argument that could explain our finding is that the reference group that we have used in our analysis is, in fact, not as non-ideological as they have self-reported. That is, it could be that these voters perceive themselves as not having strong preferences with respect to redistribution and efficiency, but in fact they do have a preference for efficiency. This could be particularly the case since our sample to a large extent exists of economics and business students. Since we have used the non-ideological students throughout our analyses as the reference group, there naturally is a stark contrast with the socialist voters, but hardly any contrast with the capitalist voters. Admittedly, at this stage, this explanation is speculative and warrants further research.

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Appendix

Table 1a: Treatment order per session

	Treatment order				
Session	**1st**	**2nd**	**3rd**	**4th**	**5th**
1	**Treatment 1**	**Treatment 2**	**Treatment 3**	**Treatment 5**	**Treatment 4**
2	**Treatment 1**	**Treatment 3**	**Treatment 2**	**Treatment 4**	**Treatment 5**
3	**Treatment 2**	**Treatment 1**	**Treatment 3**	**Treatment 5**	**Treatment 4**
4	**Treatment 5**	**Treatment 2**	**Treatment 4**	**Treatment 1**	**Treatment 3**
5	**Treatment 3**	**Treatment 4**	**Treatment 2**	**Treatment 1**	**Treatment 5**
6	**Treatment 4**	**Treatment 3**	**Treatment 5**	**Treatment 2**	**Treatment 1**

Instructions

General

This is an experiment in decision-making in which collective decisions determine individual earnings. Your final earnings are typically between 8-16€, so please follow the instructions carefully when making your decisions. Your attendance already earns you 5€ (the show-up fee). Your earnings will be paid-out in cash when the experiment has finished. Your earnings can be collected individually and are unknown to other participants.

Description

During the experiment you will interact in a sequence of decision-periods. In the experiment you will have a different role in each period. The computer randomly determines the role of each person each period. The allocation of roles is random and is not affected by any decision made in the experiment. Each period your role will be expressed as a colour. That is, you are blue, green or yellow. These colours have no meaning apart from displaying your role. Each period, the probability of having each role is 1/3.

Before the experiment we determine in which computer-room you are placed. Each room is assigned a random subject number. This number is displayed on your computer screen. You will never learn the identity of the persons behind other subject numbers. Similarly, others will never learn your identity.

Your choice

In every period, the first decision you make is whether you want to vote or not. If you want to vote, you pay a voting cost. If you decide not to vote, you have to wait until the other participants (that did decide to vote) have made their decisions.
If you decide to vote, you have to make a choice between two options: “option A” and “option B”.

How the outcome is determined by the votes

The outcome, “option A” or “option B” that receives a strict majority of the votes will be the winning outcome. In case of a tie, the computer randomly determines with a 50% probability, which option wins. The winning outcome (option A or option B) will have consequences for: how much you earn and how much other voters earn (i.e. the distribution of earnings), and aggregate (total) earnings.

Your earnings

Your earnings are determined by your role (colour) and what the group chooses as the winning outcome. Earnings and costs are expressed in Experimental Currency Units (ECU’s). These are converted into real Euros after the experiment at the exchange rate: 200ECU = 1€. If you decide to vote you pay the voting cost of 20 ECU’s. At the beginning of the experiment you receive 300 ECU’s in a lump-sum payment to cover voting costs.
There will be 40 decision periods. In every period, each participant has to decide whether he/she wants to vote, and, if yes, which option to vote for. At the end of the experiment (after 40 periods) 5 periods are randomly chosen as the periods that determine earnings. You only pay the voting cost if the respective period is selected to determine earnings.

Experimental sections

The experiment consists of five sections of 8 periods. In each section, the setup of the experiment differs. That is, the number of voters in your group changes per section. You are informed about this change on the first screen that appears in each section. Please read the information carefully.
In some sections computer-subjects will enter the experiment. Every computer-subjects will make random decisions: with a probability of 50% it will vote, with a probability of 50% it will not vote. If it decides to vote, it will vote for option A with 50% probability, or vote for option B with 50% probability. Thus, it does not matter for the computer-subjects decision whether it is blue, green or yellow. It holds throughout the experiment that 1/3 of the real-subjects (you) in each group is blue, 1/3 green and 1/3 is Yellow. It is made clear at the beginning of each section whether, and how many, computer-subjects that take part in the experiment in a given section.

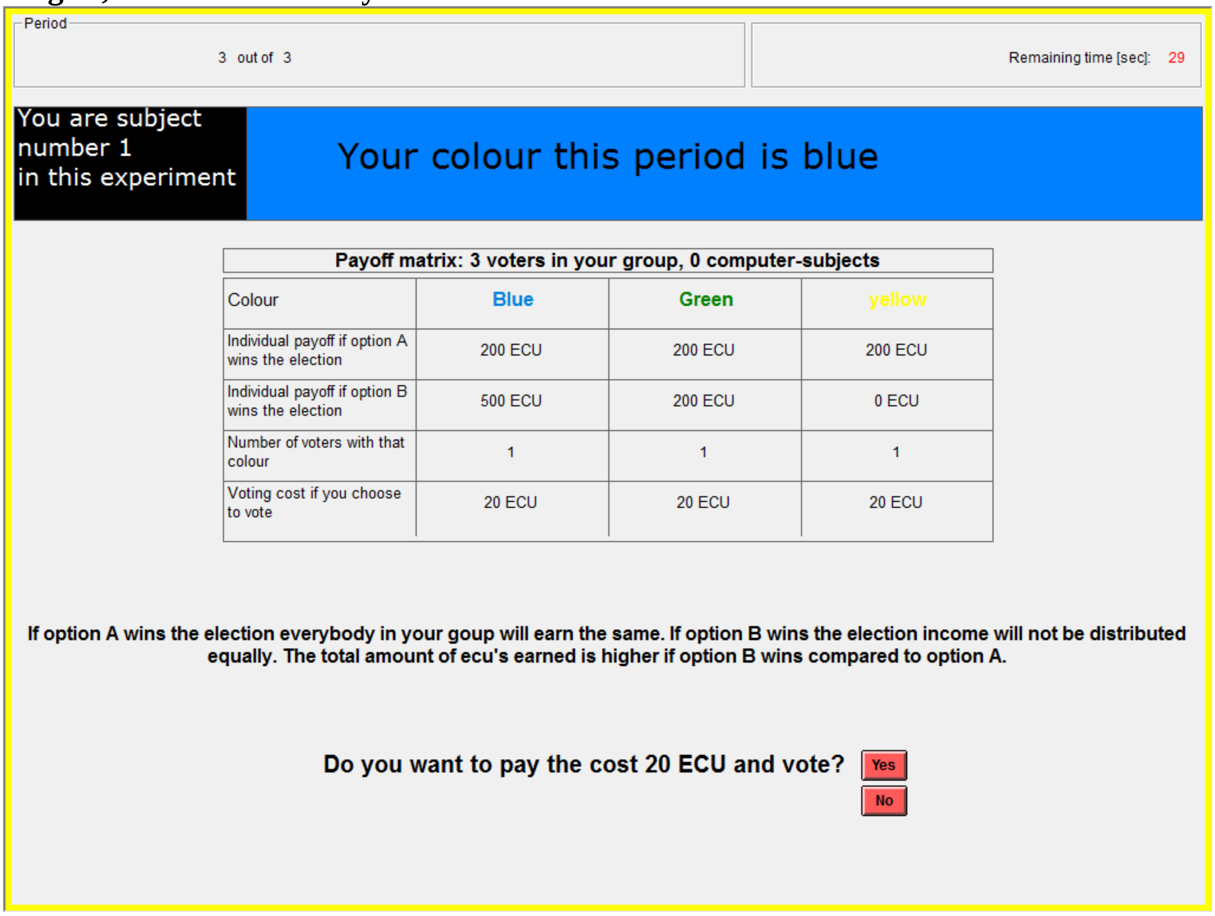
Procedure

Each period consists of 3 stages: A decision of whether you want to vote stage (stage 1), a voting decision stage (stage 2) and an outcome stage (stage 3). In each stage your subject number is shown. The role you have that specific period is also shown, i.e. whether you are blue, green or yellow.

Stage 1

In stage 1 you decide whether you want to vote or not.

Stage 1, Decision whether you want to vote



Colour	Blue	Green	yellow
Individual payoff if option A wins the election	200 ECU	200 ECU	200 ECU
Individual payoff if option B wins the election	500 ECU	200 ECU	0 ECU
Number of voters with that colour	1	1	1
Voting cost if you choose to vote	20 ECU	20 ECU	20 ECU

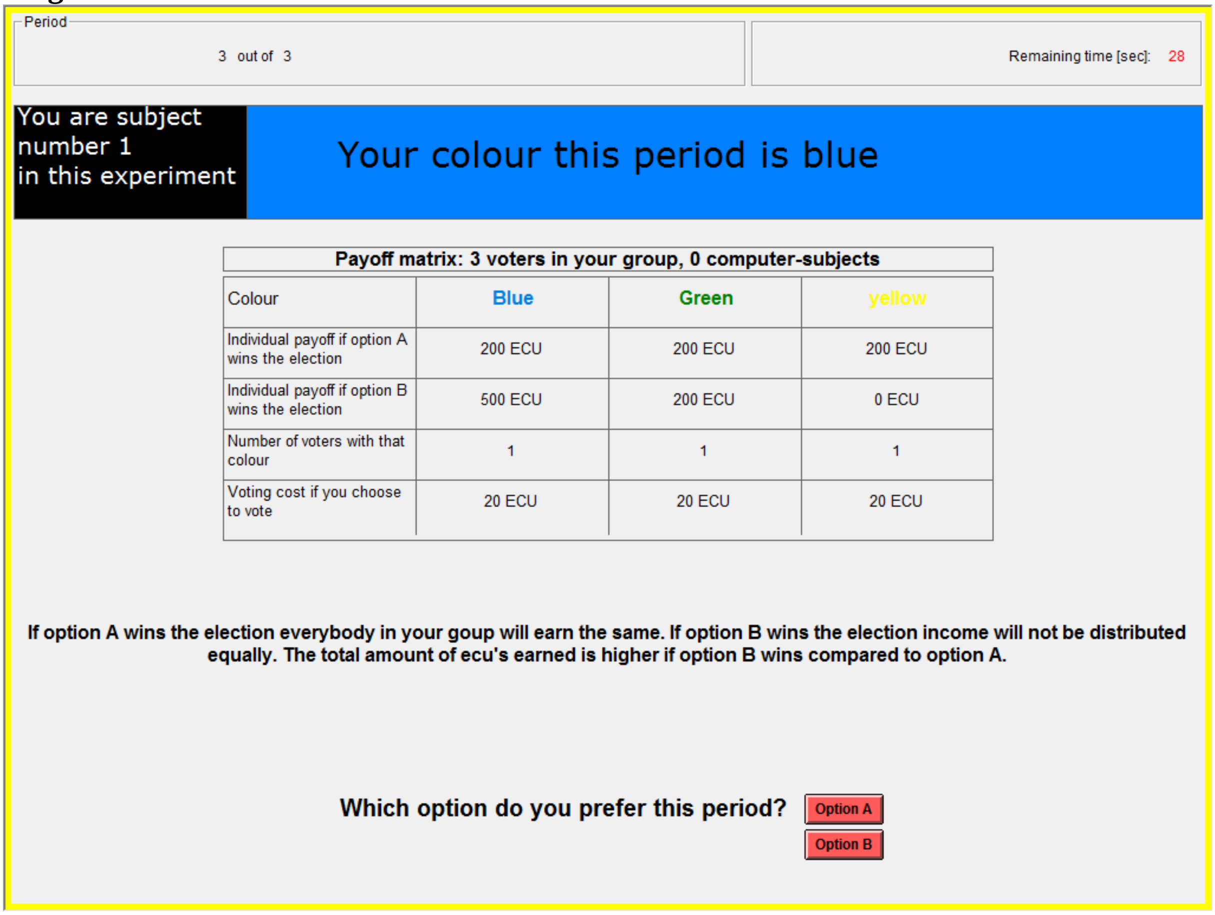
The payoff matrix for the period is shown in each stage. The payoff matrix displays earnings to all voters conditional on their colour and for the scenarios that either option A or option B wins the election. If “option A” wins: blue, green and yellow voters receive an equal payment of 200 ECU. If “option B” wins: blue voters will receive 500 ECU, green voters will receive 200 ECU and yellow voters will receive 0 ECU. Furthermore, if “option A” wins, the total amount of ECU’s earned is lower compared to the total amount if “option B” wins. These characteristics remain constant throughout the experiment.

The payoff matrix also displays the number of voters. The voters are equally allocated over the groups. There will always be 1/3 of each type of voter. In this example: there is 1 blue, 1 green and 1 yellow voter in your group. None of these are computer-subjects. Every period you are randomly mixed into new 3 person groups.

Stage 2

In stage 2 you decide whether you vote for “option A” or “option B”. If you decided not to vote you wait until the other participating subjects have voted.

Stage 2: Decision what to vote



Payoff matrix: 3 voters in your group, 0 computer-subjects

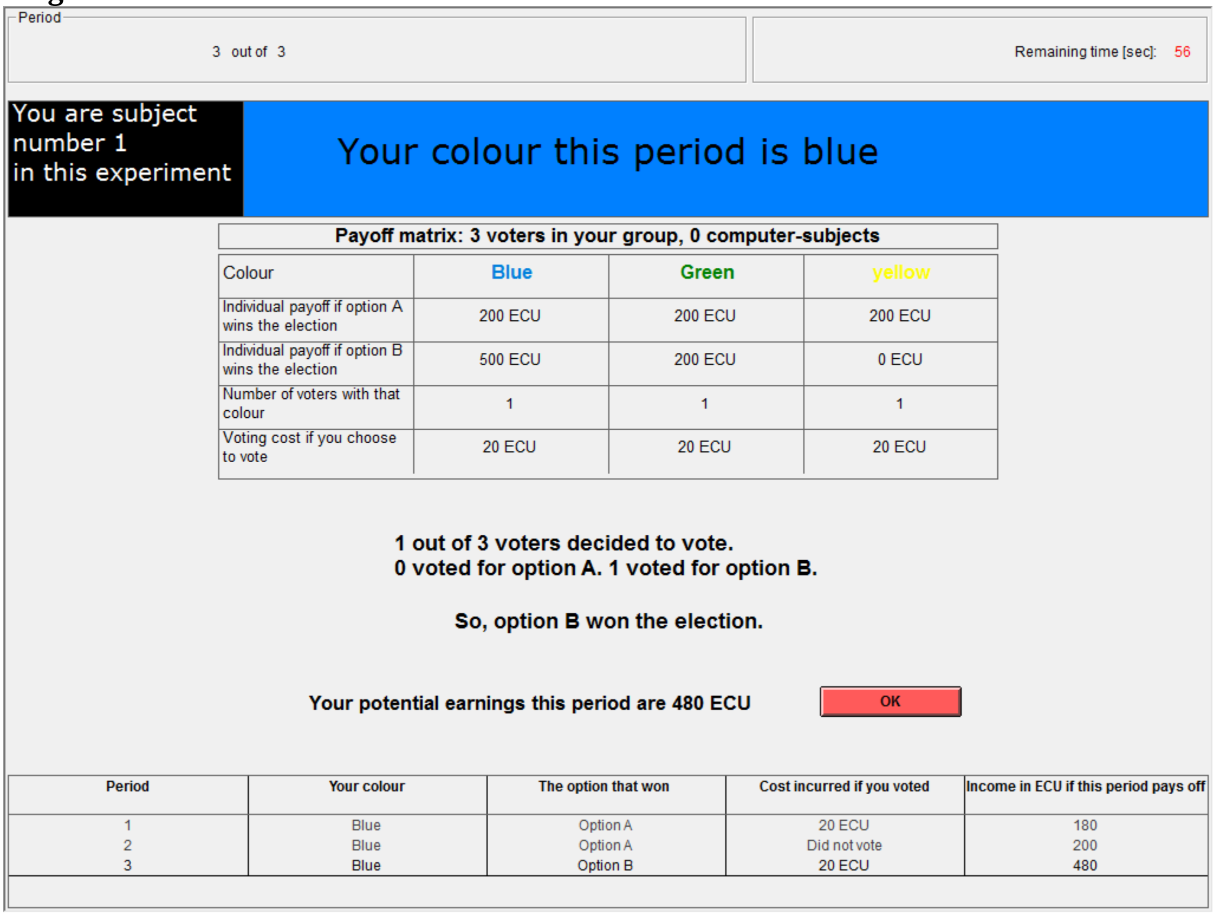
Colour	Blue	Green	yellow
Individual payoff if option A wins the election	200 ECU	200 ECU	200 ECU
Individual payoff if option B wins the election	500 ECU	200 ECU	0 ECU
Number of voters with that colour	1	1	1
Voting cost if you choose to vote	20 ECU	20 ECU	20 ECU

Stage 3

In stage 3 you will be informed about the outcome of the period. You are informed about: The number of voters that decided to vote. How these votes are allocated over option A and option B. What the winning outcome is, and, your potential earnings in the specific period.

On the bottom of the outcome screen you see a table displaying the history of outcomes and your potential earnings. When you have read the information, please click the "OK" button and the experiment continues to the next period.

Stage 3: Outcome


Period

3 out of 3

Remaining time [sec]: 56

You are subject number 1 in this experiment

Your colour this period is blue

Payoff matrix: 3 voters in your group, 0 computer-subjects			
Colour	Blue	Green	yellow
Individual payoff if option A wins the election	200 ECU	200 ECU	200 ECU
Individual payoff if option B wins the election	500 ECU	200 ECU	0 ECU
Number of voters with that colour	1	1	1
Voting cost if you choose to vote	20 ECU	20 ECU	20 ECU

1 out of 3 voters decided to vote.
0 voted for option A. 1 voted for option B.

So, option B won the election.

Your potential earnings this period are 480 ECU

OK

Period	Your colour	The option that won	Cost incurred if you voted	Income in ECU if this period pays off
1	Blue	Option A	20 ECU	180
2	Blue	Option A	Did not vote	200
3	Blue	Option B	20 ECU	480

Summary

- Every period, you randomly draw a colour (role), i.e. whether you are blue, green or yellow.
- You decide whether you want to vote or not.
- If yes, you vote for either "Option A" or "Option B".
- The winning outcome is the outcome that receives a strict majority of votes. In case of a tie the computer decides with a 50% probability whether "option A" or "option B" wins.
- Your potential earnings depend on your role and the winning outcome.
- 1/3 of the human voters are blue, 1/3 green and 1/3 yellow. This holds throughout the experiment.
- The total number of voters in your group will change over the course of the experiment. In some sections computer-subjects will enter the experiment. You will be informed about this.
- After 40 decision periods the experiment ends with a short survey.
- The computer randomly chooses 5 periods that pay. Afterwards you can collect your earnings.
- If you encounter any problems during the experiment please open the door to your computer room and we will come to you!

Test questions

1. A majority votes for “Option B”. If you are yellow that period, what will your payoff be?
   Give a number?

2. A majority votes for “Option A”. Will income be distributed equally that period?
   Yes or no?

3. Will aggregate (total) income be higher if option B wins, compared to option A?
   Yes or no?

4. In case of a tie, how is the winning outcome determined?
   50/50 probabilities or 30/70 probabilities?

5. Will the number of voters in your group change over the course of the experiment?
   Yes or no?

6. What is the probability that a computer-subject that decided to vote votes for option A?
   80 % probability or 50% probability?

7. How many of the periods in the experiment determine your monetary payoff?
   3, 5 or 7?

Are there any questions before we begin the experiment?